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OUTLOOK

By Bruce F. Shank, Editor

Chicago's Butler National golf course has become the world's largest turf laboratory. Turf experts from across the U.S. are flying into Chicago to get samples of the diseased Toronto bentgrass that turned the greens of Butler National an embarrassing brown prior to the Western Open. An absolute identification of the disease which devastated the greens will take a few more months. Samples of the fungus must be isolated and proven harmful to healthy Toronto bentgrass. Only then can the real guilty fungus be identified.

Meanwhile, Dr. Joe Duich of Pennsylvania State University is directing renovation of the Toronto greens with Penneagle, a bentgrass he selected and developed. At the same time, the Golf Course Superintendents Association of America has sponsored a research committee headed by nationally known turfgrass pathologist Houston Couch from Virginia Polytechnic Institute in Blacksburg.

The list of those involved in the postmortem at Butler National reads like the *Whos' Who* of turfgrass research. It has been a long time since one golf course has drawn so much research attention. GCSAA is looking at the cause of the disease, the maintenance history of the course, and the role of the superintendent in the problem.

According to Fred Grau, the incident spells the end of monoculture vegetative creeping bents. Seed from polycrossed bentgrasses will now have the clear vote of confidence of superintendents and turf researchers. It also signifies the critical importance of paying heed to advances in turfgrass culture. Turfgrass pathologists themselves disagree on many points of their science. Only further research can clear up the confusion.

The people involved are taking this problem seriously and using it to test their problem solving ability in a real field situation rather than in a laboratory. The club is cooperating amazingly. Butler National will not let its reputation falter by one incident. Rather than hiding behind some public relations barricade, it is opening its doors to turf scientists and to GCSAA and USGA.

Perhaps if more clubs with turf incidents opened their courses up to turf specialists we would have more practical solutions in shorter time. Scientists need the field challenges and the financial support to apply their research. Perhaps Butler National has opened the gate to more rapid progress with turf management. **WTT**

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GREEN INDUSTRY NEWS

Reseeding Mount St. Helens no routine project

A ravaged landscape and the logistical problems of working around it plus a still very volatile Mount St. Helens makes reseeding this area a formidable task.

For Wolfkill Feed & Fertilizer Co. of Monroe, WA, the challenge lies to reseed 20,000 acres of ash-covered land between Sept. 4 and 30.

The $3 million project is vulnerable for a couple major reasons: early rains in this area, that average 140 inches a year, could destroy germinating turf; and a new eruption of the mountain amplifies the danger for any plant and human life in the area.

"There is no precedent set for a project like this," says Gene Stokes, contract specialist for the Soil Conservation Service. The federal agency is responsible for specifying the materials and deciding the contractors for the job, which it has already done. "The things we are doing are not proven to work."

Groups have criticized the program as being a waste of dollars — both the federal 90 percent and 10 percent balance from the state or local governments or private land owners. Yet none of those paying the 10 percent portion have refused.

It's worth the money to the towns of Longview, Kelso, and Castle Rock, WA, parts of which have already been hit by a mudflow which ran 35 to 40 feet high and two miles wide at 30 miles per hour. It's also valuable land to timber companies such as Weyerhauser and Burlington-Northern, and those who depend on the Toutle, Cowlitz, and ultimately Columbia River for fishing and shipping. The U.S. Army Corps of Engineers now has dredges working to reestablish the flow of the streams which are landlocked and exposed to rains that may produce gushing floods.

The Soil Conservation Service accepted bids per acre from Wolfkill, Jacklin Seed Co., and Cominco-American. Bids were granted in two parts, distinguishing Forest Service land from the Department of Natural Resources. Because of logistics—the Forest Service land is the highest elevation—type of seed, and fire requirements, this land costs more per acre. This area of 8,000 acres will cost $600,000; the remaining 12,000 acres of DNR land will cost $980,000. If all goes smoothly, extraneous costs may stay below the $3 million estimate.

"The weather's the major problem," says Jim Price, vice president of marketing for Wolfkill. "If storms roll in, we can't fly and the seed won't germinate before Sept. 30. If by next summer we have three living plants per square foot we would consider it a success."

All seeding and fertilizing is being done by helicopter. Wolfkill will have to truck the materials 80 miles from its plant to load for aerial application.

The Forest Service has specified a mix of the following seed for its lands: perennial ryegrass, 10 pounds per acre; annual ryegrass, 15 pounds; subterranean clover, 4 pounds; and hairy vetch, 4 pounds for a total of 33 pounds per acre.

The DNR has specified the mix for its land as: perennial ryegrass (pasture types), 5 pounds; annual ryegrass, 15 pounds; creeping red fescue, 10 pounds; timothy, 2 pounds; white clover, 2 pounds; and birdsfoot treefoil, 2 pounds for a total of 36 pounds per acre. Normarc, Inc. of Tangent, OR, is supplying the seed, approximately 700,000 pounds for the total project.

Fertilizer requirements per acre, the same for both areas, consist of the following: available nitrogen, 30 pounds; available phosphoric acid, 60 pounds; available potash, 60 pounds; and total sulfur, 20 pounds per acre.

By spring, with the hope that the fall seeding holds, more reseeding, revegetation, and reforestation will occur. If the fall seeding fails, Mount St. Helens will be susceptible to severe slope erosion and the surrounding area could be wearing its ash and mud.

Dredging the Toutle River occurs while 20,000 acres of the surrounding countryside is being reseeded.

CONVENTION

ISA conference draws many skilled educators

Forty-two experts in varied fields of arboriculture — commercial, municipal, and utility—spoke to 700 people attending the International Society of Arboriculture's 56th annual conference in Hartford, CT.

Topics of the five-day program, held at the Sheraton Hotel Aug. 10-15, covered mixed plantings, insect problems, systemic injections, line clearing, and an array of specialized subjects for the arborist.

This conference marked the first in which the ISA has set aside one full day for commercial exhibits. Attendants thus had more time than brief coffee breaks to view displays of 36 exhibitors.

At the final day's luncheon, Presi-

dent Gordon King and Past President Yvon Fournier discussed the need for a commercial arborist association of ISA. A planning committee of five ISA members was appointed to study and evaluate the needs for it. A student from the University of Massachusetts will run a survey of the membership, and the planning committee will submit its findings at next year's meeting in Michigan.

Executive Director Cal Bundy says the movement has strong support. Sixty percent or approximately 4,000 members of ISA are involved in commercial arboriculture.

INDUSTRY

Court upholds CPSC power mower standard

The safety standard for walk-behind power mowers issued by the Consumer Product Safety Commission (CPSC) has survived industry challenges and been upheld by the Fifth Circuit Court. Barring further delays, mowers with all the required safety features will be on the market in 1982.

The CPSC standard requires the following safety features for mowers: protective shields at the rear of the mower to keep the operator's feet clear of the blade; shields that will automatically close or prevent the blade from spinning when a grass-catcher or other accessory is removed; and a "deadman control" that must be held down to allow the blade to turn and that will, when released, stop the blade within three seconds, according to *Consumer Reports*.

The standard also requires the protective shields to pass two tests: one for strength, another to insure that the shields won't interfere with a mower's convenient operation, so consumers won't consider them a nuisance and remove them. As a final precaution, both rotary and reel-type mowers must carry a warning label. The safety devices and tests will add about $35, on average, to the price of a mower, according to CPSC estimates.

CPSC claims that blade contact accounts for about two-thirds of the injuries, or 77,000 persons a year, that sustain bruises, cuts, or the loss of at least one finger or toe. The agency says that mowers could be designed to eliminate or reduce the severity of more than three-fourths of all blade contact injuries.

The Outdoor Power Equipment In-

Continues on page 68

GOVERNMENT UPDATE

Farm labor bill introduced to House

Rep. Leon Panetta, D-CA, has introduced Farm Labor Contractor Registration Bill HR 7824 to the House of Representatives which will effectively exempt nurserymen from amendments to the FLCR Act. This bill is identical to the amendments recently passed by the Senate's 57 to 37 vote.

Panetta said, "The passage of this bill would not only restore the basic intent of the law but would ensure that the Department of Labor directs its limited resources to the important and difficult job of protecting farmers and farm workers from the abuses of unscrupulous crew leaders who generally move with the harvest and serve as independent labor suppliers to more than one operation at a time."

The American Association of Nurserymen (AAN) and American Sod Producers Association (ASPA) are urging their members to write their representatives asking for the bill's support.

ASPA members are also being asked to send any copies of their replies to ASPA Washington representative Tom Hammer, % Nelson & Harding, 1101 Connecticut Ave. N.W., Suite 800, Washington, D.C. 20036.

Assistant ag secretary Cutler resigns

Rupert Cutler has resigned his assistant agricultural secretary position to accept a position with the National Audubon Society, which specializes in research and lobbying on wildlife, wilderness, public lands, endangered species, and water resource management.

LANDSCAPE CONTRACTOR NEWS

Architects' exhibit will attract suppliers

Landscape industry suppliers are expected to exhibit their products and services to hundreds of landscape architects at the 1980 American Society of Landscape Architects' Educational Exhibit Nov. 22-24.

Held in conjunction with the 1980 ASLA annual meeting at the Fairmont Hotel in Denver, the industry show will attract landscape architects to learn 1980 state-of-the-art information for their design profession.

ALCA directory contains over 800 listings

The Associated Landscape Contractors of America has published the 1980/1981 Who's Who in Landscape Contracting with listings for commercial landscape contractors throughout the United States.

The new listing is available on request to landscape architects, general contractors, and other qualified buyers and specifiers of landscape work. Cost is $3. Write on letterhead to: ALCA, 1750 Old Meadow Road, McLean, VA 22102.

PLANNING AHEAD FOR COLORFUL AND MIXED VARIETIES IN PLANTING DESIGNS

By Gary A. Anderson, Chairman, Horticultural Industries Technologies Div., Agricultural Technical Institute, Ohio State University, Wooster, OH

Autumn is a good time to sit back and reflect on the performance of annual plantings during the past season and begin planning next year's combinations. It is easier to visualize the size, color compatability, and design impact when looking at the plants in a garden than it is when thumbing through a seed catalog or gardening book. The success or failure of certain plants in the specific growing site can be noted. Plant growth may reflect drainage problems, shade that is too dense for the particular plant, or presence of a soil-borne disease.

Any conclusions reached should be viewed in the light of the particular growing season. If the latter part of summer has been unusually wet, it is not uncommon to witness poor performance of geraniums and petunias. Frequent rains spoil the flowers and high humidity provides ideal conditions for fungus growth. During a more normal season, these flowers will bloom profusely and can rightfully form the color backbone of the landscape.

Mixed boarder near the entrance to the Agricultural Technical Institute in Wooster, OH, shows salmon cannas, mixed coleus, blue salvia, blue petunias, salmon geraniums, and ageratum. Mixed plantings can add interest to building entrances where viewers can see the plant material at close range.

Versatile Plantings

Some flowering annuals are slow to get established in the spring, but once they start growing they provide a reliable source of color under a wide range of environmental conditions. Vinca or periwinkle *(Catharanthus roseus)* is one such plant. During cool spring weather, especially if this condition is combined with moisture and fertilizer stress, the young plants may look chlorotic and show little growth. As the season progresses and temperatures increase, the plants fill in, giving a rich green mat of shiny foliage topped with hundreds of delicate pink and white blossoms. The plants hold up under periods of extreme heat and prolonged drought but are not damaged by frequent rains and high humidity.

Wax begonias remain one of the most reliable plants for garden color throughout the entire season. They bloom freely both in sun and shade, making them an excellent choice when light conditions vary significantly within a given planting area. When flower beds are partly shaded by trees or extend around to the north side of a building, a sun loving annual in these beds will not perform well. Fibrous rooted wax begonias flower heavily in the sun; however, foliage may be somewhat sun scorched. This blemish is seldom very noticeable since the plant is covered by so many flowers. Wax begonias can tolerate drier conditions than impatiens but grow and develop much better when adequate water is available.

Begonias fill out into nice mound-shaped plants. Although plants spaced 8 inches apart will quickly fill in forming a solid ground cover, some feel that a greater spacing allows for more definition of the plant's natural growth habit and requires fewer plants per planting area. Another aspect to consider is that greater spacing allows for more air movement around the plant and reduces the probability of disease problems during wet, humid weather. Wax begonias are good candidates for well delineated planting patterns and also combine well with other plants in mixed plantings.

Petunias are a widely used annual and a favorite of many groundskeepers for sunny areas. When they are in full bloom they are very showy; however, they do have a few drawbacks. After a peak of bloom in late June or early July, the plants become tall and lanky, often breaking over. This condition is worsened if there is a lot of rain. Water tends to spot the petals, and rain, especially when it is accompanied by wind, riddles the open flowers and helps break down the plants. The solution is to cut back the plants several inches, which induces lateral branching and eventually more compact flowering stalks. But while this vegetative rejuvenation is occurring, the petunia bed is devoid of color. This problem can be lessened by cutting back different areas of the bed at different times so that future blooming peaks are staggered. Starting the growing season with compact, stocky plants will also result in improved growth throughout the season. When petunias are grown in combination with other plants, either in the ground or in containers, the legginess is less of a problem, since the other plants serve as a source of support and new blossoms continue to form on the ends of stems.

Continues on page 14

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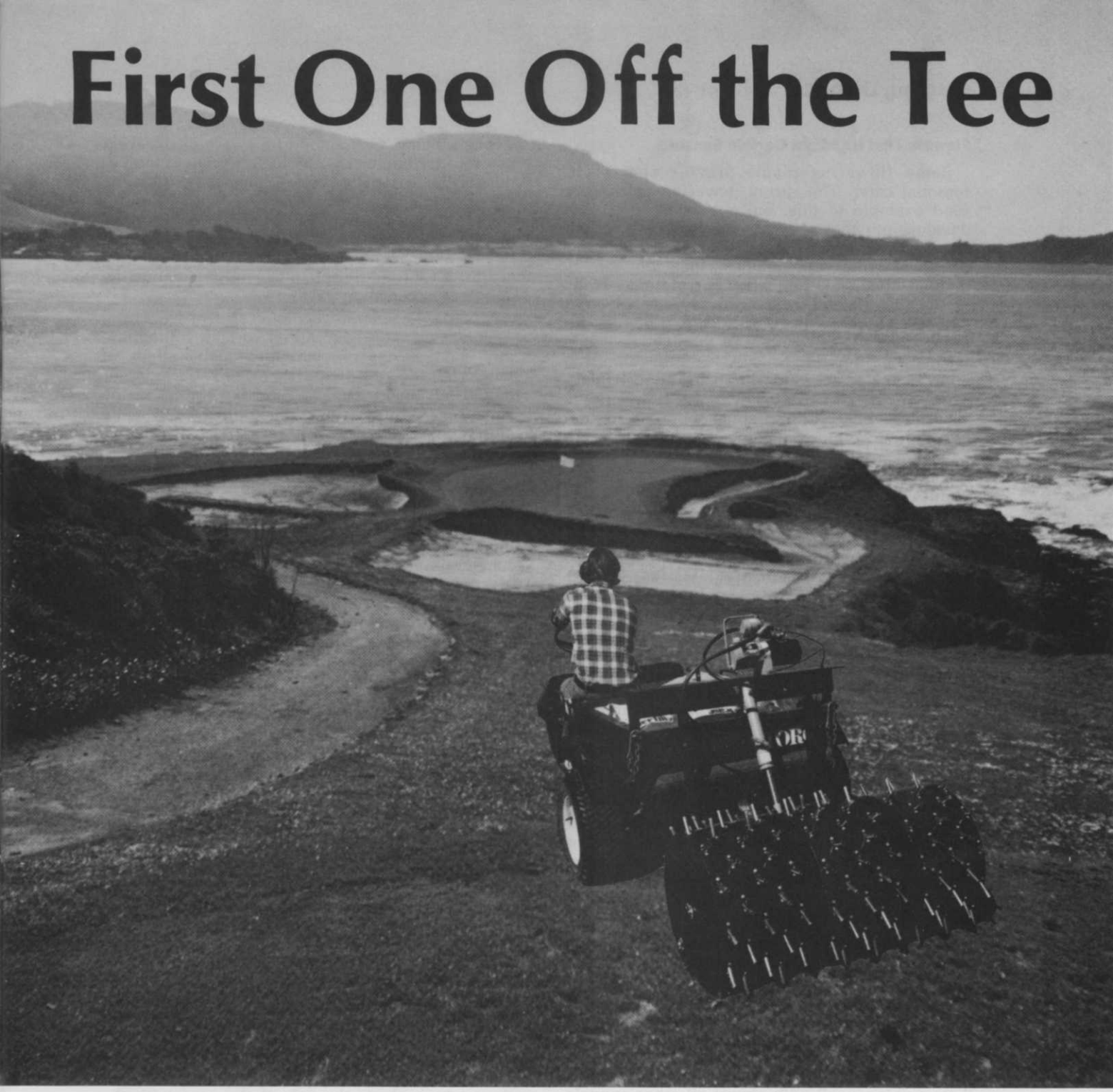

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Planting Designs *from page 12*

Flowers That Highlight Certain Seasons

Some flowering plants provide spectacular seasonal color. The spring flowering bulbs are a good example of this. Bulbs planted in the fall develop into showy harbingers of spring without much special care. The bulbs make a good alternative planting with annuals since they can be planted after frost has killed the annuals. In the spring, they finish flowering before it is safe to set out most annuals. The bulbs can either be removed before planting the annuals or the annuals can be set between the bulb foliage. The foliage must be allowed to die back naturally so that enough food is stored in the bulbs for growth and flowering the subsequent year. If this method is practiced, there is a period in late May and early June when the beds look a bit untidy, but it is an economical and labor-saving technique for bulbs that retain their quality year after year.

Narcissus are excellent plants for reliable spring bloom. They multiply over the years and do not usually decrease in flower size. Tulips are less robust and usually produce smaller flowers with much less uniformity the second year. Hyacinths are showy and fragrant the first year, but are notorious for running downhill in successive years.

Chrysanthemums are outstanding for fall color and are especially valuable when early frosts kill many of the annuals. Chrysanthemums can be grown in beds by themselves or mixed with other plants. Since no color can be expected from them until late August or early September, patches of mums should be scattered among other flowers or perhaps placed to the back of a border. Violas are a good candidate to plant with mums. These frost tolerant plants can be put out very early in the season when the mums are small. Violas perform best when temperatures are cool but many varieties bloom throughout the summer.

Foliage Plants

Some foliage plants can be used effectively by themselves or as a reliable backbone in the annual garden. Coleus is a showy plant, free of insect and disease problems. It can be used in shade or full sun to give showy mounds of interesting foliage. Rain may cause many flowers to fade but the bright color of coleus will be unaffected.

Dusty miller is an extremely dependable plant that combines well with almost all other annuals. The silvery leaves tie together other colors that might normally clash. Silver and white give unity to planting and enhance other colors. Red begonias and nicotiana appear more red when accented with white than they do by themselves.

Kochia, parsley, opal basal, flowering kale, amaranthus and 'Irish Lace' marigold are plants grown primarily for their foliage. They can be combined to make an all foliage garden with interesting color and texture variation. When combined with other flowers they can compliment or accent the flower color.

Garden Designs

Planting designs should be worked up before plant material is purchased. There is no right or wrong scheme. One should be aware of different possibilities and constantly look for new combinations. Otherwise, one can fall into a rut of planting the same thing year after year.

The simplest scheme is a bed of all one variety of plant. Large areas of a single color have high visual impact and carry a great distance. Red geraniums against a railroad tie retaining wall are distinctive and can be seen many yards away.

Mixed colors of a single plant variety can be used to add more interest to a bed without getting into any complexities of combining plants. Beds of mixed floral carpet snapdragons, mixed zinnias, or mixed portulacca can sparkle like jewels in the sun. The variation lures the onlooker to come closer and examine the different colors.

Simple borders of two or three plants usually require plants of different height. Shorter plants are placed in the front of the border or outside of the bed. The result is a stair-stepping effect. Color combinations may be either contrasting or analogous. An example of a contrasting color scheme is 'Nicki Red' nicotiana and white sweet alyssum. Yellow sunflowers and orange African marigolds with gold dwarf marigolds in the foreground provide an analagous color scheme with considerable height difference.

More complex planting schemes may include geometric and mixed designs. Patterned designs are usually somewhat formal. Triangles of dusty miller may enframe areas of wax begonias, geraniums, ageratum, or other plants of approximately the same height. Designs of flags, maps, clocks, or faces are possible if tidy plants with a low growth habit are selected. Wax begonias, telanthera, santolina, and parsley are good choices.

Mixed plantings can be used to give a European look or a more informal country garden appearance. Combinations of several plants are best appreciated when viewed close up. They are good near entrances to buildings or places that are not passed by too rapidly. An advantage of this type of planting is that during the growing season those plants which are best adapted to the weather or soil conditions take over while the others recede into the background. This may be referred to by some as a "never-fail" approach to gardening. It is practical since one never can predict accurately what kind of a season is ahead.

In planning a mixed planting, one should scatter the various plants throughout the area with the taller ones being generally placed toward the back. The stair-stepping effect should be staggered gradually toward the front. The larger more dominant plants are usually placed first, with smaller accent plants added last. One possible combination set in front of a background of salmon cannas is assorted coleus, blue salvia, salmon geraniums, salmon wax begonias, and blue ageratum. Another good background plant is cleome.

If you are not familiar with some of these plants, now is a good time to look for them and decide if they would be an asset to your grounds. If you haven't tried some of the different plants, plan to do so next year. Variety not only pleases the public but makes the groundskeepers job more exciting.

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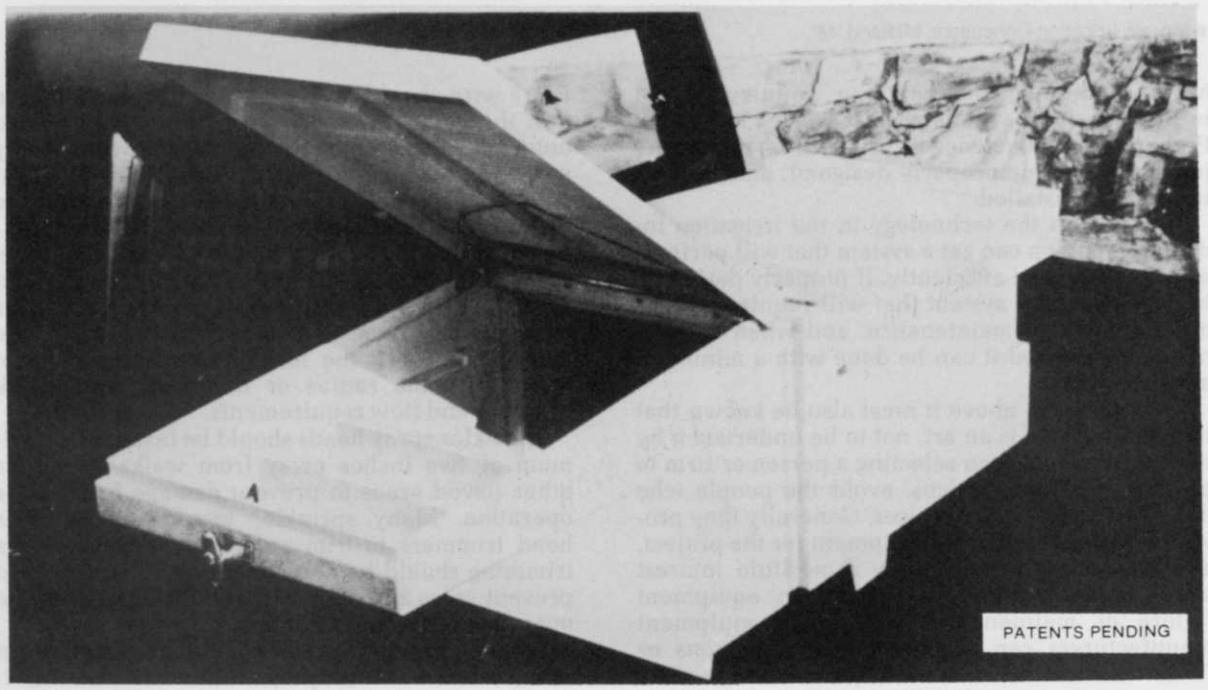

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IRRIGATION PROJECTS REQUIRE THE RIGHT DESIGN AND PROPER EQUIPMENT

By Mike Morey, Irrigation Consultant, Midland, MI

Many people throughout the country would hesitate to specify that a project receive irrigation. Perhaps their reluctance is formed from a past project which was improperly designed, and in turn, improperly installed.

Today, with the technology in the irrigation industry, a person can get a system that will perform economically and efficiently. If properly designed, he can also get a system that will require a minimum amount of maintenance, and when maintenance is required it can be done with a minimum amount of time.

In view of the above it must also be known that irrigation design is an art, not to be undertaken by the unknowing. When selecting a person or firm to provide irrigation designs, avoid the people who don't charge for their services. Generally they provide the plans to sell the equipment for the project, and once it is installed they show little interest about what happens in regards to equipment failure or maintenance costs. Most equipment manufacturers can provide a list of persons or firms that are trained in irrigation design. The American Society of Irrigation Consultants has members throughout the country.

An irrigation design consultant can provide the following services: 1. Preliminary studies and cost estimates 2. Preliminary plan for review 3. Construction plans and specifications 4. Assistance in receiving and reviewing bids. 5. Construction supervision 6. Final project reports. The design consultant can provide many other services. It is best to contact your local consultant for specific details. A qualified consultant can design using any manufacturers' equipment as per your choice.

The following are just a few items that if used will prevent many problems found in irrigation systems.

Velocity of water in the piping system must be controlled. If not, it can cause lines to burst or will weaken piping over a period of time. Many polyethylene (PE) pipe failures can be directly attributed to excess velocity. The Plastic Pipe Institute (PPI) recommends the following: "The maximum safe water velocity in a thermoplastic piping system depends on the specific details of the system and the operating conditions. In general, 5 ft/s is considered to be safe." Many pipe manufacturers do not recommend any velocity over 5 ft/s. for use in turf irrigation.

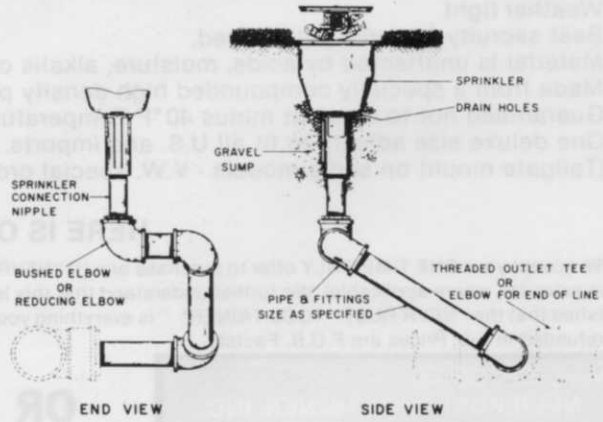
Sprinkler control valves should be equipped with manual bleeds to permit operation without the controller. This feature can save on maintenance time if controller location is not close to the valve area. Valves also should be equipped with manual flow controls to enable a person to close the valve if it fails to close automatically. Valves should be installed in valve boxes large enough to permit manual operation for removal of solenoid and/or valve cover without any earth excavation required. Box depth should extend to depth of valve to prevent any earth cave-in onto the valve. Extra wire should be provided in the valve box so that the valve cover can be removed and placed onto the earth next to the valve box without any cutting of solenoid wires. Wire connections at valves and on all underground splices should be water tight by the use of dri-splice connectors.

Sprinkler heads are rated by each manufacturer for maximum spacing and should be derated for existing wind conditions as per manufacturers recommendations. When approving alternate equipment check the maximum spacing and not necessarily the radius or diameter. Also check pressure and flow requirements.

Sprinkler spray heads should be installed a minimum of two inches away from walks, curbs, or other paved areas to prevent damage from edger operation. Many sprinkler manufacturers offer head trimmers to trim grass around heads. This trimming should be done on a regular schedule to prevent grass and debris from interfering with the operation of the sprinkler heads.

Rotary sprinkler heads should be installed on swing-joints on large projects for two reasons: 1. Protection of lateral piping against damage from heavy maintenance equipment running over heads and 2. Facilitating setting heads to proper grade.

Figure 14-53, taken from The Turf Irrigation Manual by James A. Watkins, illustrates the swing



joint. Note that the horizontal nipple just below the head is shorter than the nipple connected to the lateral. This is important. If the upper nipple is too long, and the head is depressed deep enough from the vertical load of heavy equipment, the lateral could be crushed.

These joints must be assembled from threaded nipples and fittings to be effective. Threads provide the swivel action needed to counteract either top loading or side impact. Swing-joints should be installed in a manner that the nipple into the lateral pipe fitting will loosen under load on the head, not tighten.

Caution: Pressure loss in swing-joints can affect head performance if not sized correctly. Often,

Continues on page 21

Sure, there's more to maintaining quality, disease-free turfgrass than a couple of fertilizer applications. But turfgrass scientists across the country are reporting that a fall application of IBDU (31-0-0) can produce turfgrass with better root development and less disease problems.

Dormant turfgrass plants continue to produce rhizomes and roots, even though vertical growth has stopped. During this time nitrogen should be made available to the turfgrass plant as carbohydrates are naturally accumulating. Thus, scientists say, the optimum timing for nitrogen applications is during the fall and early winter months.

IBDU (31-0-0) is ideally suited for dormant nitrogen fertilization. Because of it's slow release characteristics based on hydrolysis, IBDU releases nitrogen later in the fall and earlier in the spring promoting better rhizome and root growth. A fall fertilizer program using IBDU should produce healthier more vigorous turfgrass plants and reduce the severity of several turfgrass diseases.

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Irrigation *from page 16*

flow required by the head will cause excessive loss if swing-joint is the same size as the head inlet. In this case, joints are sized one to three sizes larger, as required. Material may be schedule 40 galvanized steel or schedule 80 PVC. The latter is preferred because it is non-corrosive.

Impact rotary heads should never be installed without a gravel sump as shown. This sump will keep water drained which accumulates in the sprinkler housing during operation. If not drained, this water will fill the housing and cause dirt and debris to enter the housing, which will effect the operation of the head, cause premature wiper seal failure, and can make the head stick in the operating position after use. In sandy soils the sump should be protected in a manner (tar paper, plastic, etc.) that will prevent sand from washing into the sump both top and sides. In dense soils this pit (sump) may need to be extended in depth to insure proper drainage during operation.

Precipitation rates of sprinkler heads that are valved together should be the same or as close as possible. For example: A 180° arc should apply only one-half as much water as that of a 360° arc. And a 90° arc should apply one-quarter of the GPM than that of a 360° arc. This ratio should not be exceeded by more than 15%. Many impact rotary heads and gear-drive heads must be valved separately to achieve matched precipitation rates because of pressure, flow, and spacing requirements.

Avoid system designs which use sprinkler equipment from many different manufacturers. This will only increase the cost of installation and maintenanace. Most sprinkler manufacturers offer all the equipment required for a proper system. This statement will undoubtedly be disputed by many design consultants. Selection of sprinkler equipment for a particular project should be discussed fully by the owner and consultant, with consideration of parts and service availability in years to come.

Landscaping is one of the most important factors in a proper irrigation design. Many systems perform poorly because the landscape was not considered during the irrigation planning. Or, the irrigation was not considered during the landscape planning. The irrigation consultant and landscape architect should work together on a project in regards to: 1. Shrub and tree plantings 2. Shaded and sunny areas (should be valved separate) 3. Topography 4. Soil types 5. Water requirements.

In many instances, alternate planting locations will not change the overall aesthetic effect planned by the landscape architect, nor will it increase the cost of landscaping. Additional sprinkler head locations to accomodate the landscape will increase system cost.

There are many other items that are keys to proper irrigation systems which are too numerous to list. It is hoped that the items listed will help many people to become aware of certain standards. This in turn, will insure that the irrigation system performs to a high level of satisfaction.

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PARK MAINTENANCE IN DALLAS—CONTRACT VERSUS FORCE ACCOUNT

By Philip Huey, Assistant Director, Park and Recreation Dept., Dallas, TX

Philip Huey presented this paper at last January's Park and Recreation Maintenance-Management School held at Oglebay Park, Wheeling, WV. Both the National Recreation and Park Association and North Carolina State University sponsor the week-long program each January.

The spring and summer of 1978 marked the second year of a program utilizing contracts to accomplish certain phases of park maintenance.

The objective of this program was to provide contractual maintenance for park areas at less budget impact than as incurred by park forces. The group of contracts included neighborhood parks, library sites, and medians at 37 locations.

These sites were in all sections of the city and involved our three more intense classifications of maintenance. These are Class A, which is basically irrigated and with horticultural development mowed with a reel mower on a seven day schedule. Class B is irrigated without horticultural development, except for trees, mowed with a reel mower on a 7-10 day schedule. Class C is usually unirrigated, mowed with rotary type mowers, and is mowed on a 12-18 day schedule depending on rainfall intensity.

The contracted areas included 20.25 miles of medians, 1,468.39 acres of parksites and 6.75 acres of library sites. Our estimated contract cost was $100,000 and the bids came in at $99,223 with fourteen contractors being selected out of 25 who bid. Eleven of the fourteen were minority contractors.

Because we wanted to give bidding opportunity to the widest possible number of individuals, the contracts were broadly written and bonding, which is usually mandatory on all our contracts. Insurance requirements were also waived on park and library contracts, but remained on median contracts for reasons of high risk in traffic injuries.

Individual performance was made a special provision on all park and library site contracts. This meant the person signing the contract must be the person who actually performed the work. Contractors working under this special provision were not authorized to hire employees for assistance in the landscape maintenance. There was a limit of two properties per contractor, and equipment (1 mower and 1 edger) was provided for each contractor involved in park caretaker maintenance.

From the management standpoint, the amount of time required to put together the contracts was minimized since format was taken from the previous year's contracts, which had been developed by the City Attorney's Office.

Because we were trying to write the contract loosely to get the maximum number of bids, particularly from individuals and small contractors, the attorney had spent a lot of time working out special provisions so the City would be reasonably protected while still meeting the requirements of a small business contract.

Before proceeding with the actual experience in this project, let me enumerate our goals. They were to:

1. Provide private contract maintenance at park areas of equal quality but at less cost than the park department maintenance forces.
2. Improve maintenance at all contracted locations to include (a) better litter control, (b) better turf maintenance, and (c) more closely manicured ground cover, shrubbery, and flower beds.
3. Reduce maintenance costs at least by 10 percent to include supervisory and administrative costs in administering the contracts.
4. Make greater availability of remaining permanent park department personnel for more meticulous less easily contracted responsibilities.
5. Provide more efficient use of the dollars allocated because of reduced employee carrying costs in retirement, vacation, holidays, injury, worker's compensation, etc., and
6. Give more participation by small and minority contractors in the City of Dallas bidding process.

There is an Office of Minority Business Opportunity within our Purchasing Department whose sole responsibility is to seek out and encourage minority contractors to bid on City of Dallas contract, material, and construction requests. This division worked diligently to locate such contractors, and we feel they did all that is reasonably possible to find competent contractors.

In addition, we placed advertisements in 15 daily

Continues on page 24

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Park Maintenance *from page 22*

and weekly area newspapers, two of which were minority papers. We made announcements on the radio stations, one with a minority listening audience and the other a local country-western music station.

Our efforts were rewarded when minorities were successful with 79 percent of awarded contracts, representing 52 percent of total contract monies. All companies which were awarded median contracts were small businesses with five or less employees.

After close counseling with prospective bidders in a pre-bid maintenance meeting where we actually told them the bid limits, the bids came in at a reasonable price and at a level where they could be accepted.

The fine points of a manicured maintenance program are missing in the maintenance of this crape myrtle bed. The bed is not weeded or edged and litter is not picked up.

Work for most of the contractors began about April 10, 1978, which was an early date for contractors to start on the growing season. This was an advantage to both of us and a vast improvement over the previous year's late start.

We provided a separate type of maintenance contract and specifications along with the overall request for bid that went to each prospective bidder. These outline our expectations.

Following are some observations made during the course of the contract:

1. Contracts were properly executed by both the Park Department and the contractor. There were not any unnecessary delays in signing the forms and approving the median contractor's insurance.

2. Contractors were familiar with the specific locations of their job sites. This was due to close orientation received from each district supervisor in a pre-maintenance meeting held April 1, 1978.

3. Contractors presented their own schedule to follow and it was approved by the district supervisor. Most of the contractors adhered to the approved schedule.

4. Landscape inspection was handled by the district supervisors who were familiar with the maintenance requirements of each park site. This method of inspection was not as time-consuming as the year before since the supervisors checked contracted sites along with their regular check route, thus eliminating any special trips.

5. All of the contractors had grounds maintenance experience. Our specifications did provide for rejection of their bid on the basis of "no previous experience."

6. Contact with each contractor was handled by the district supervisor concerned on an "as needed" basis and did not present a problem.

7. The contractors were adequately equipped. Median contractors had ample and efficient equipment and personnel. Other individual contractors who were provided with city-owned mowers and edgers for the most part took good care of the equipment. There was one case where equipment was not returned as specified and final payment was held by the city for reimbursement.

8. Payments were made to individual contractors on a weekly basis and to median contractors (companies) on a monthly basis. There was some problem with the time lapse between when the contractor submitted payment vouchers and when payment was actually received (approximately 1-1/2 weeks). However, the contractors were informed of the unavoidable payment delay before they entered into contract agreements.

9. City owned equipment which was loaned to individual contractors had a detrimental effect on park force maintenance. This was because the equipment was tied up for an entire season, even though it was only used every 7 days or less.

By midsummer 37 percent of the maintenance locations had been canceled and only nine contractors were still performing. At this time, before completion of our growing season and the contracts, I judged the whole project as not reaching the program goals. Even though this year's program had been by far more successful than that of the previous year, the contract results were still not meeting, let alone exceeding, those displayed by park forces.

The one bright spot in the contract picture at this time is still the individual contractor, responsible for all maintenance except large area mowing on a small neighborhood park. It is still recommended that this be approached more cautiously with only pre-qualified individuals and that the individuals be required to furnish their own equipment.

We believe this aspect of contract maintenance has greater possibilities because we are dealing with one person, in a confined area, on a full or almost fulltime basis where contact is reasonably early, work expectations easily outlined, and where daily contact by supervision is about the same as with a regular park employee.

We have a lot of polishing to do on this approach to maintenance, but if what has to be done to make the contracts work adds up to a higher cost than doing it with our own personnel then it is not worth it and we have spent money unnecessarily. **WTT**

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Turfgrass Maintenance

Turfgrass Maintenance

Turf first boomed in the late 1920's. Much of the progress made prior to the Depression is the basis for today's methods. In this part of the Turf Management Series, we trace chemicals, equipment, and practices back to their origin in the United States.

The next two parts of the series cover turf disease and insects. For that reason some of the material on these subjects is missing in this part. Furthermore, this section had to be abbreviated to fit the magazine format. As you know, the six parts of this series will be published as a book in 1981.

I hope that you will pass on your historical knowledge to us for inclusion in the book. Please don't hesitate to write to us about your days in turf maintenance, whatever field. Already I've received dozens of letters telling of important events in turf which I had overlooked.

This project has been a labor of love. It has made me tired but fulfilled. Please join me in trying to record our historical legend for the turf managers of the present and future.

Bruce F. Shank

Bruce F. Shank, Editor

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THE EARLY YEARS

"At first sight, the growing of a piece of fine turf seems to be a simple matter, and this has misled many persons to underestimate woefully the difficulties to be overcome." These remarks were made in 1917 when growing a piece of fine turf may not have been simple, but certainly simpler than today. They are the words of Piper and Oakley, USDA turf scientists in Arlington, Virginia, in their book *Turf for Golf Courses*, now out of print.

In the past 63 years the turf industry, largely propelled by the needs of golf and sod production, has solved many of the conditions once considered Mother Nature's ire. In some cases our solutions have created new problems. Some suggest the amount of new knowledge is too much to expect a turf manager to know, inferring the value of the turf does not warrant the effort.

A few authors have estimated the value of the turf industry to dramatize the need for research and the importance of the science. Nutter and Watson estimated a 1965 value for turf expenditures at nearly $4.5 billion in the American Society of Agronomy publication *Turfgrass Science*.

Money is not the only reason to pursue answers to questions raised by practicing turf specialties. The main reason should be to provide a complete set of facts on turf biology to develop logical, scientific answers to problems encountered in the field. We still can't claim to have enough information to solve such problems as disease, weeds such as nutsedge and *Poa annua*, and insects such as *Aetenius spretulus* and the Greenbug aphid. We are playing with less than a full deck much of the time.

With needed support, there is little reason why many of these still unsolved problems can't be tackled during the 1980's.

Tom Mascaro

Founder of West Point Products, the company that introduced the aerifier, verticutter and three-wheel turf vehicle.

Consider what turf management problem solving was like 60 years ago. Actually, what superintendents noticed back then is the backbone of today's knowledge. Piper and Oakley reported in 1917 that alkaline soil encourages weed growth. In 1917, following a severe epidemic of Rhizoctonia brown patch on turf (as identified by Piper) an agricultural fungicide developed in the late 1800's called Bordeaux mixture was used on turf. Reel mowers pulled by teams of horses mowed golf courses until the first gasoline tractors were developed and applied to mowing in the early 20's. The reel was a British invention dating back to 1830.

The compost pile was a major source of fertilizer for early golf superintendents, then called greenskeepers. In addition to topsoil, manure and compost, turf managers used bonemeal, cottonseed meal, dried blood, hoof meal, nitrate of soda, sulfate of ammonia, acid phosphate, rock phosphate, and muriate and sulfate of potash.

Herbicides were virtually nonexistent. Sulfate of ammonia was said to help control white clover, arsenite of soda was used for chickweed control, and even sulfuric acid and gasoline were injected or brushed on the crowns of weeds. Arsenicals were used for worm and insect control.

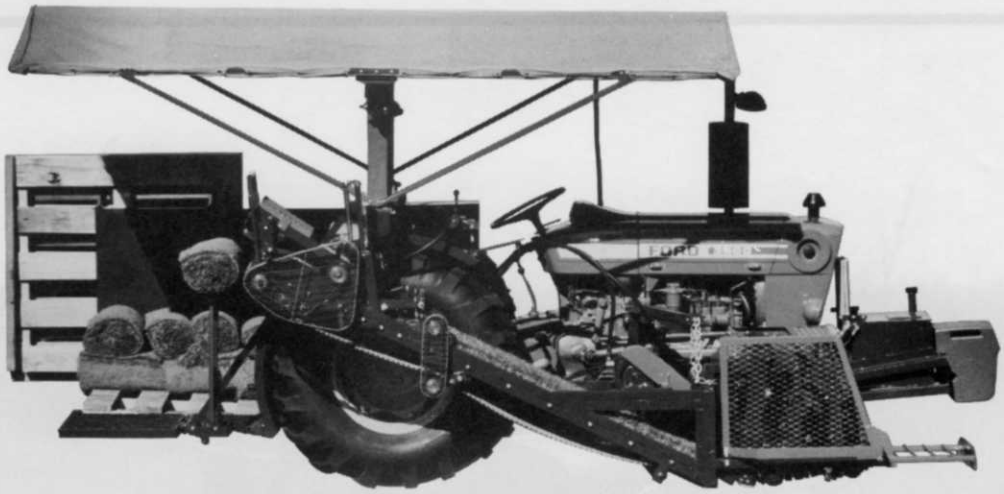
Weed control, grass cutting, and installation were performed totally by hand. Labor was cheap. Scythes, aerifying forks, sod spades, and numerous other hand tools preceded the mechanical versions of today. Many superintendents held their maintenance tricks secret from golfers and other superintendents. This was their method of job security. It was also one of the main targets of early organizers of greenskeeper associations.

Topdressing with sand and organic soil was practiced in the first 20 years of the Twentieth Century. In some cases greens were topdressed weekly and fairways at least annually. Greens were sliced prior to topdressing with crude carts dragged across the green which had many small blades on the bottom to cut the surface.

Large drop-type seeders were available and pulled across golf courses by horses. Horses provided the muscle on many courses into the 30's. They wore special steel or leather boots to prevent damage to the turf. Greenskeepers were very careful to keep heavy horses and later machinery off their greens.

Spot sodding was the solution to weed infestation and disease. One foot squares of bentgrass were cut from areas in good condition, trimmed to the proper thickness, and carefully placed where poor turf had been removed.

Irrigation was either by flooding or surface hosing. Irrigation was by



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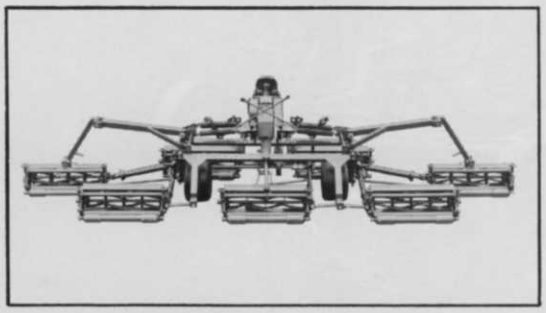

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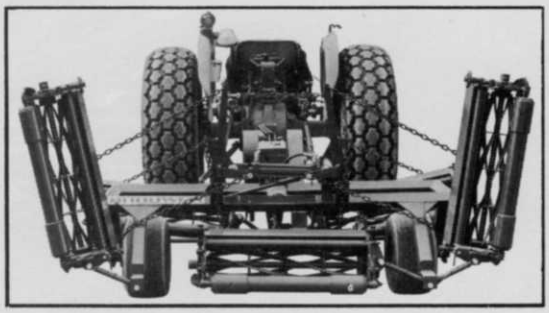

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The Turf Equipment People

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Toro Junior Tractor *and five-unit gang mower on well-groomed golf course in 1936.*

no means a new concept, dating back to Egyptian and Greek cultures. But it would be another 30 years before pressurized, quick coupling systems would take over.

The United States Golf Association Green Section was established in 1918 to solve turf problems. During the next ten years, three valuable publications were started to serve golf courses *(USGA Green Section Bulletin, Golfdom* magazine, and *The National Greenkeeper).* The *Bulletin* was published by The Green Section from 1921 to 1933 when the Depression forced staff cutback. 1926 was the founding year of the National Association of Greenkeepers of America, predecessor to the Golf Course Superintendents Association of America. NAGA started *The National Greenkeeper* in 1927 for its members. A third publication was launched in 1927 by Herb and Joe Graffis, *Golfdom.* It was the only private business publication and it was designed to serve all needs of the golf course, not just the turf needs.

1927 was also the year of the first educational program for turf managers at Stockbridge Winter School, part of the University of Massachusetts. This eight-week course was taught by Professor Lawrence Dickinson during January and February. Greenskeepers from as far west as Illinois and Ohio attended this concentrated course on turf maintenance.

Lawrence Dickinson
Taught first school for greenskeepers at the University of Massachusetts in 1927.

Between 1920 and 1931 the number of golf courses in the U.S. exploded from 500 to more than 5,000. Equipment and chemical companies quickly took note of this growth market and started designing products for it.

Consequently, companies such as Toro, Jacobsen, Worthington Mower Co., National, Roseman, and Buckner started making products for the golf maintenance market. World War I had pushed the gasoline engine into use over steam. Engineers, like National Mower Company's R.S. Kincaid, refined the tractor/mower combination into a practical tool for golf courses. Although greenkeepers had reservations about compaction with heavy mowers, they bought the gasoline tractor mowers as fast as companies could make them.

Mallinckrodt, Du Pont, and Bayer developed improvements to the Bor-

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(U.S. Plant Patent No. 3150)

The GREENER Kentucky Bluegrass

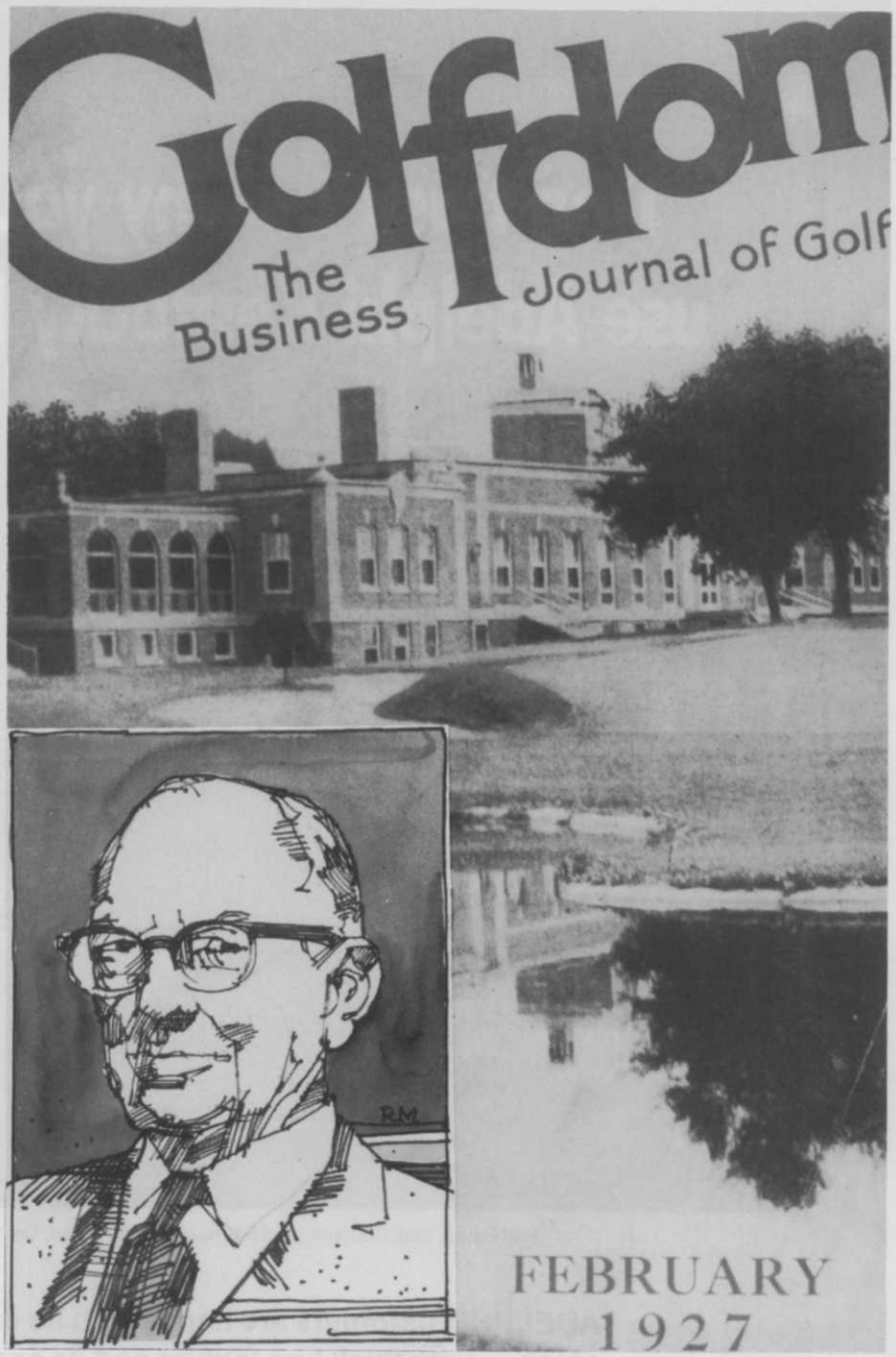
deaux mixture for disease control. Mallinckrodt developed Calo-Clor and Calogreen, mercuric chloride compounds. Bayer produced Uspulum Nu-Green and Du Pont offered Semesan, a chlorophenyl mercury compound. These fungicides were used for many years.

By the late 20's the golf industry was very healthy. Other sports were gaining strength on a college and professional level. The concept of a well-groomed memorial park instead of standard cemetery originated in the 20's. Scotts' publication *Lawn Care* was launched and created more residential interest in turf. Turf was booming. It was another 30 years before turf regained its momentum after the Depression and two wars. During that period, however, progress continued.

John Monteith, director of the Green Section, spearheaded much of the technical progress in the 20's by working in conjunction with the USDA facility at Arlington. The *Green Section Bulletin* kept turf managers current. It was a blow when USGA was forced to lay off everyone in the Green Section except Monteith and stop publication of the *Bulletin* in 1933. Among those let go were Arnold Dahl, who had coauthored *Turf Diseases and Their Control* with Monteith in 1932 and Fred Grau, a graduate of the University of Nebraska turf program. Dahl became a turf consultant and Grau began his Ph.D. work at the University of Maryland.

Progress did not come to a complete halt in the 30's. Du Pont introduced the fungicide, Thiram, in 1931. Research continued on weed control and turfgrass selection at universities. Combinations of fertilizer and lead arsenate were proving effective. Merion Golf Club superintendent Joe Valentine selected the first quantities of Merion Kentucky bluegrass in 1936, the same year Grau joined up with Burt Musser at Penn State after completing his Ph.D. O.J. Noer, a progressive businessman with the Milwaukee Sewerage Commission travelled the U.S. touting Milorganite and Milarsentie for turf.

The preservation of the science can be attributed to regional personalities, whether they were golf course superintendents, suppliers, university specialists, or association leaders. Without them, the turf market would have lost ground. The hard times may have unified turf managers, especially golf course superintendents, and caused continued progress through discussion of mutual concerns. This unity kept healthy manufacturers interested in the market and encouraged inventiveness in those that had mechanical talent.



Turf and golf growth in the 1920's *was recorded by a number of new publications including Golfdom, founded by Herb Graffis (inset) and his brother Joe in 1927.*

In 1936, Tom Mascaro launched a topdressing supply business in West Point, Pennsylvania. He quickly made acquaintance with superintendents and turf specialists, such as Monteith, Dickinson, Musser, DeFrance at Rhode Island, and Sprague at Rutgers. It was already understood that some type of cultivation prior to topdressing was beneficial. Removal of thatch by hand raking was also practiced. Ten years after it began, West Point Products, with the technical assistance of Grau, developed the first commercially produced aerifier and verticutter. The first aerifier was tractor drawn and used a series of spoon-shaped rods to pierce the soil surface. His technology was purchased

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Write **148** on reader service card

in 1969 by Hahn Inc. of Evansville, Indiana. Turf technology regained momentum in the late 40's and has yet to stumble like it did in the 30's.

After World War II there was a flurry of activity in the turf market. Fanny Fern Davis, Green Section director during the war, supported the use of a new herbicide, developed in 1941 to be a fungicide or insecticide. It was a substance that selectively affected the growth of plants, specifically broadleaved plants, without harming grasses. 2,4-D was the start of a chemical revolution in weed control. It was the basis for the new commercial applicator market, treating roadsides, drainage ditches, rights-of-way, and lawns.

The 40's was also the first identification of turf as a special committee in the American Society of Agronomy. This was an important event since now turf related research would be reported in the *Agronomy Journal*. The creation of the committee was pushed by then director of the Green Section, Fred Grau, who returned to USGA for eight more years of service.

Progress was also made with fertilizers. It was discovered in the early 20's that combining the hydrogen in natural gas with nitrogen produced ammonia. By reacting ammonia with carbon dioxide gas, a more stable source of nitrogen was created, urea. But urea was volatile and did not persist in the soil as a source of nitrogen to plants for very long. It was discovered that by chemically reacting formaldehyde with the urea a longer lasting product was obtained, ureaformaldehyde. Both Du Pont and Nitroform Agricultural Products introduced UF products in the 40's, Uramite and Nitroform.

This chemical revolution extended to growth retardants. Giberellic acid was the first to receive attention for turf use in the late 40's. Growth retardants required very precise use and exhibited side affects which were unacceptable to major turf markets.

The chemical that really started the revolution was the insecticide DDT. Commercial production of this chemical began during the War and continued until environmentalists, spurred on by Rachael Carson's *Silent Spring*, stopped its production and sale in certain countries. DDT was the first major breakthrough with insecticides since the discovery of the arsenicals, nicotine, and pyrethrum decades before.

Subsurface irrigation began to gain acceptance in the 40's. California companies set equipment standards which spread rapidly to the Southeast and slowly northward. Quick coupling systems of the 40's were installed with galvanized metal, copper, or asbestos pipe. Automatic controls (electromechanical) were introduced in the late 50's. In the 40's and 50's regional agricultural irrigation suppliers were a major factor in turf, such as Skinner and Thompson. Toro purchased the California company Moist-O-Matic in 1958 and provided a national source for turf irrigation equipment in addition to Buckner and Rain Bird.

Eb Steiniger
Superintendentof Pine Valley Golf Club in Clementon, New Jersey, since the 30's.

Permanent irrigation heads slowly gained share of market with quick couplers, especially in arid/semi-arid regions where daily irrigation was necessary. Spray, impact and eventually gear-driven heads were developed. Plastic began overtaking metal and asbestos in the 60's for pipe and heads. Installation was simplified by the use of flexible plastic pipe. Computer technology has added flexibility to the controller in the past decade.

While the chemists worked on new fungicides, herbicides, and insecticides in the 50's, a second generation of turf specialists were studying under the first. These new investigators tested the new chemicals as part of their research work. The result was a very productive 60's. Butler, Burton, Daniel, Duich, Engel, Indyk, Kozelnicky, Kneebone, Miller, Murray, Reike, Shoulders, Skogley, Watson, and Youngner improved the market's data base. At the same time they coordinated regional turf field days and conferences further strengthening the turf industry.

They reported on new preemergence herbicides such as DCPA, DMPA, bensulide, siduron, trifluralin, and terbutol. They tested the postemergence herbicides mecoprop, dicamba, dalapon, simazine, and the methanearsenates. They pinpointed the role of nematodes in turf disease and studied the new contact and systemic fungicides. IBDU was evaluated as the second major slow-release fertilizer. They helped turf managers understand the new chlorinated hydrocarbons, organophosphates, and carbamate insecticides.

The 50's and 60's were the introductory years of many improved turfgrasses selected and produced by seed. The first fulltime turfgrass breeding position of Dr. Reed Funk at Rutgers was experiencing great success with new possible grasses.

During this time, the Green Section narrowed its scope of service and established regional technical areas each staffed with an agronomists. Al Radko took the reins from Fred Grau in 1953. At Beltsville, Felix Juska headed turf research until Jack Murray stepped in. Professional golf reached new levels of spectatorship with the skills of

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Rolls up even greater savings.

Labor savings. Cost savings. All rolled up in one turf utility vehicle. That's what the Cushman 18-hp Runabout is all about. And now, with 50% greater payload capacity, it can save you even more on those big turf jobs.

The 18-hp Cushman Runabout can mobilize a grounds maintenance crew of two, and haul up to 1,500 pounds of cargo. So your men can carry more equipment or supplies in the Runabout's standard 4½′ pickup box, saving trips from supply areas to the field.

The Runabout is a labor-saver from the word "go." Its wheel-type steering and tight 17′ turning circle make the Runabout maneuverable and easy to handle. Special tires make it easy on turf, too—even under full load. And its 3-speed synchromesh (second and high) transmission and heavy-duty tubular steel frame make the Runabout about as reliable a turf vehicle as you can find.

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For even greater savings, the fuel-stingy 12-hp Runabout lets an operator handle 1,000 pounds of cargo with responsive handlebar steering. And, like its big brother, this Runabout runs on regular gas, and is backed up by Cushman's worldwide dealer network.

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Write **152** on reader service card

Early gasoline-powered single reel mower. *Circa 1920. Courtesy Toro Co.*

Hogan, Sneed and Palmer.

Events receiving little attention but important nonetheless were the development of wetting agents for turf, additives for better spray coverage and adherence, colorants, and high impact plastics and fiberglass.

By the end of the 50's, it was clear turf was back on its feet and ready to grow rapidly. To serve the turf manager in areas other than golf, *Weeds Trees & Turf* was launched in 1962. Four years later, *Grounds Maintenance* was started. These publications published news and interpretive articles on the mass of technical data being produced. The market was gaining in professional stature and drew the attention of potential suppliers. Commercial publications assisted these suppliers in reaching the new market.

The graduate students of the 60's are now attaining professor status. It has become their challenge to put all the progress into a digestable and logical form. Stiffer environmental regulations make their tests more intense and involved. Among this group are Beard, Dunn, Gibeault, Hall, Larsen, Shearman, Smiley, Turgeon and Turner.

Jim Watson

Studied under Musser at Penn State and went from there to Texas A & M and Toro to solve irrigation turf irrigation needs.

The commercial sector began to provide attractive employment for some of these new graduates. It began to pick up some of the research load previously left to the university. Examples are ChemLawn's Miller, Joyner, Martin and Wilkinson; Davey's Funk; Turf Seed's Meyer; International Seed's Pepin; and Loft's Hurley.

The 70's was a decade of questioning existing turf practices. Loss of certain chemicals, resistance to others, and rising costs of water and petrochemicals forced a reevaluation of turf maintenance. Integrated management and lower maintenance levels are being studied for practicality. Better attention to basics like rootzone construction, pH, and drainage may lower dependence on corrective measures.

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MAINTENANCE PRACTICES TODAY

The pioneering days of turf management are for the most part over. Efforts are now directed on improvement of existing equipment and new uses for existing chemicals. The primary goals of engineers and chemists now are saving labor and fuel. Even water is becoming a critical limiting factor in turf maintenance in some areas.

Safety and environmental regulations for chemicals and equipment have increased cost without increasing productivity or efficiency. At the same time, they have greatly discouraged new suppliers from entering the market. Ingenuity is too often suppressed by the liability of manufacturing today.

After ten years of trying to meet unclear and constantly changing demands by the Environmental Protection Agency, chemical manufacturers have at least a few precedents to go by in chemical registration. As a result, more uses for existing products are becoming available. However, some of the chemical workhorses of turf management are floundering in EPA's Rebuttable Presumption Against Registration Process (RPAR). In this evaluation, products with suspected dangerous side effects are prosecuted under the full weight of environmental groups. This process forces the manufacturer to reevaluate the profitability of keeping older chemicals on the market when expensive testing is mandated. If the chemical is placed in a restricted category and the market for the product is reduced considerably, the manufacturer will be forced to raise prices to cover the cost of manufacturing smaller quantities.

The equipment manufacturer will soon face new safety regulations. Mower manufacturers are being required to add a blade brake which will supposedly prevent injury to feet and hands when the mower is not in motion. This precaution will add more than $30 to the cost of a trim mower. It is likely that similar safeguards will spread to machinery such as power trimmers, vacuums, and snow blowers.

Despite this burden of protecting the buyer against himself, manufacturers are making progress. Products are evolving which do cut labor time, gasoline consumption, and down time. Much of the savings however is lost in the price of the product.

The key to turf management efficiency is combining all known money saving measures into one in-

Continues on page 45

Thoughtful superintendent *at Merion Cricket Club in Haverford, Pennsylvania, in the 20's rigged reel gangs in front of Toro tractor so that grass would be cut before heavy tractor wheels compressed it.*

When Dave Portz renovated 14 fairways with Roundup®, the members played the same day he sprayed.

Cleaning up a weedy fairway doesn't have to be a slow, messy job for you—or a hardship for your golfers.

Roundup® herbicide helps make renovation fast and efficient—as Grounds Superintendent Dave Portz discovered last year.

"If we had chosen to plow the course under, we would've had to close it," Dave says. Instead, he applied Roundup on 14 weedy fairways, and reopened the course the same day. While Roundup worked, the members played over the dying turf, with no problems.

The members—and Dave—liked that. They were glad, too, that Roundup won't wash, leach or volatilize to injure desirable plants along the fairway. Dave simply took precautions against spray drift.

This year, reach for Roundup to control many tough weeds. It can make turf renovation fast and efficient for you—and leave a lot more playing time for your golfers.

For literature, call 1-800-621-5800, or in Illinois, 1-800-972-5858.

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There's never been a herbicide like this before.

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DERBY

IS THE BEST OF THE LOT . . . BY A LOT

Derby is the leader in the new generation of turf-type ryegrasses because it performs so well in an endless variety of situations.

It was tough enough for the turf at the Rose Bowl and Super Bowl XIV, and yet it produces a dense, even surface when cut consistently to 3/16th inch on a golf green.

A dark green beauty, it is heat and drought resistant, has excellent cold tolerance, responds rapidly to fertilization and mows beautifully.

In Northern areas Derby is a natural for permanent turf including tees, greens, fairways, parks and playgrounds, playing fields and home lawns, while it is considered a premier overseeding grass in the Southern U.S.

Derby Turf-type Perennial Ryegrass

- *Germinates in less than a week under ideal conditions*
- *Thrives when cut to one inch or less on tees and fairways*
- *Mixes nicely with the fine fescues and bluegrass, retaining its good looks when cut to 1½ inches*
- *Persists in heavy, compacted, poorly drained areas where traffic is not intense*
- *Tolerates a wide range of soil types from heavy clay to sandy*

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EQUIPMENT

Jacobsen Division of Textron Inc.

A couple brothers, Knud and Oscar Jacobsen, and AJ Dremel founded the Jacobsen Co. in 1921 with the development of the "Four Acre," a lawn mower which could cut four acres in one day. This machine weighed 275 pounds and sold for $275. The following year, the founders took back all 75 pieces that were sold and checked and reconditioned them to make sure they were working smoothly.

The Four Acre was the first mower with an engine designed for parks, cemeteries, and other heavy-duty operations. The second Jacobsen model arrived in 1923, called the "Estate." The next year the company introduced the first cast aluminum, power engine greens mower. Golf course superintendents hesitated to use the greens mower but soon realized it was ideal for cutting bentgrass.

The industry's first automatic recoil starter came out of the Jacobsen workshop in 1928, the same year the company unveiled its own fairway gang mower. That year Einar Jacobsen, Knud's son, joined the company and later became president.

In the years following, the company introduced many firsts to aid those involved in turfgrass maintenance: the first polyethylene grass catcher; the first mower with four reversible, replaceable, retractable blades from rotaries; the first with pneumatic tire equipment; the first mower with hydraulic tri-plex screens; and the first out-front hydraulic fairway mower.

Before 1929, someone cutting turf of any expanse had to walk behind the mower. Thus Jacobsen saw the need for and invented the sulky, an interchangeable riding attachment for power mowers.

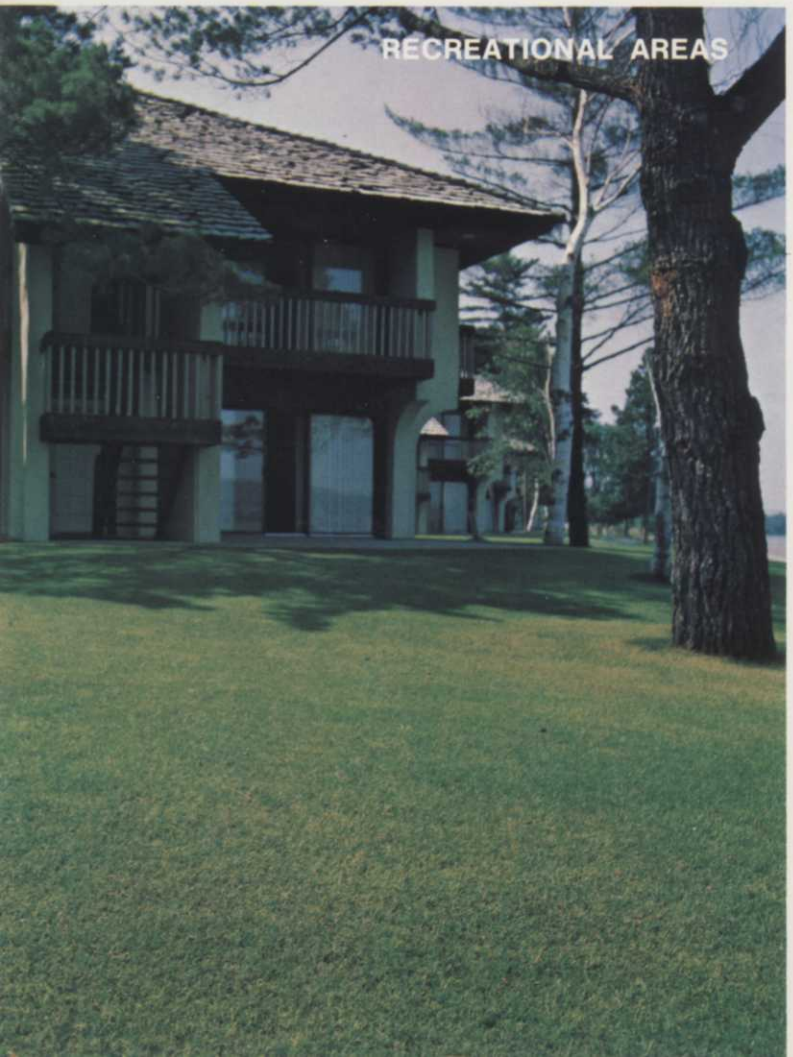
In the spring of 1939, the company introduced the Lawn Queen for $87.50. It was the first homeowner-type power mower for lawns and cut an 18 or 21-inch swath.

Jacobsen bought the Johnston Lawnmower Co. in Otumwa, IA, which built all-steel hand mowers. World War II halted lawn mower manufacturing for all but a few companies and Jacobsen built generators and other defense equipment for the Army.

The company continued to develop more products for golf courses and homeowners and in 1953 introduced power snow removal equipment to its line of other products. Jacobsen merged with the Allegheny Ludlum Co. in 1969 and two years ago Textron Inc. bought Jacobsen from Allegheny Ludlum.

GREENS

FAIRWAYS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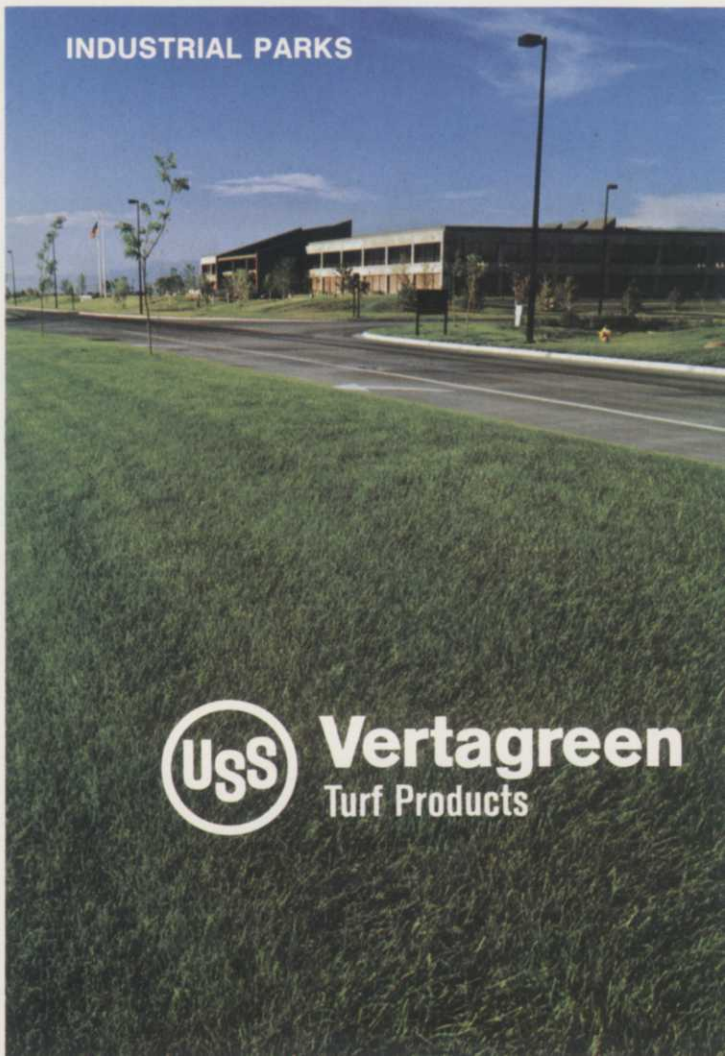
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18-4-10
FOR TEES & GREENS

Tee Green Technical Turf Food 18-4-10

NEW

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS

Total Nitrogen (N)	18.00%
Synthetic Organic Nitrogen 50% of total, equivalent to 9.00% N. Water Insoluble Nitrogen 5.5%	
Available Phosphoric Acid (P_2O_5)	4.00%
Potash from Sulfate (K_2O)	10.00%

SECONDARY NUTRIENTS

Calcium (Ca)	2.00%
Magnesium (Mg)	1.20%
Sulfur (S)	10.00%

MICRO-NUTRIENTS

Copper (Cu)	0.05%
Total Iron (Fe)	0.28%
0.03% Chelated Iron (Fe) 0.25% Fritted Iron (Fe)	
Manganese (Mn)	0.05%
Zinc (Zn)	0.05%

DENSITY: 60 # per Cubic Foot
SCREEN SIZING: 90% Minus 10 Plus 20 Mesh U.S. Sieve
COLOR: Gray
REGULAR PACKAGE: 50 # Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene
POLYETHYLENE PACKAGE: 50 # 2 Ply Polyethylene, 9 Mil Thickness

12-4-8
FOR FAIRWAYS

19-5-9
FOR FAIRWAYS

Tournament Plus 19-5-9

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS:

Total Nitrogen (N)	19.00%
5.5% Water Insoluble Nitrogen Derived from Urea-Formaldehyde	
Available Phosphoric Acid (P_2O_5)	5.00%
Potash from Sulfate (K_2O)	9.00%

SECONDARY NUTRIENTS

Calcium	1.50%
Magnesium (Mg)	0.60%
Sulfur (S)	12.00%

MICRO-NUTRIENTS:

Copper (Cu)	0.05%
Total Iron (Fe)	0.28%
0.03% Chelated Iron (Fe) 0.25% Fritted Iron (Fe)	
Manganese (Mn)	0.05%
Zinc (Zn)	0.05%

DENSITY: 50 # per Cubic Foot
SCREEN SIZING: 90% Minus 8 Plus 20 Mesh U.S. Sieve
COLOR: Gray
REGULAR PACKAGE: 50 # Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene
POLYETHYLENE PACKAGE: 50 # 2 Ply Polyethylene, 9 Mil Thickness

FOR FALL FAIRWAYS

15-5-7
FOR FAIRWAYS

Vertagreen for Professional Turf 15-5-7 with Balan®

NEW

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS

Total Nitrogen (N)	15.00%
Available Phosphoric Acid (P_2O_5)	5.00%
Soluble Potash (K_2O)	7.00%

SECONDARY NUTRIENTS

Calcium (Ca)	1.00%
Sulfur (S)	10.00%
HERBICIDE: Benefin	0.78%*

DENSITY: 65 # per Cubic Foot
SCREEN SIZING: 90% Minus 6 Plus 16 Mesh U.S. Sieve
COLOR: Yellow
REGULAR PACKAGE: 50 # Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene

*0.78 pounds technical Benefin (Balan) per 100 pounds of 15-5-7. For 3 pounds technical Benefin apply 384 pounds of fertilizer per acre. For 2 pounds, apply 256 pounds per acre.

Balan is a registered trademark of Elanco Products Company, a division of Eli Lilly Company.

15-5-5
FOR FAIRWAYS

Fertilizer for Professional Turf 12-4-8

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS:

Total Nitrogen (N)	12.00%
2.10% Water Insoluble Nitrogen Derived from Urea-Formaldehyde	
Available Phosphoric Acid (P_2O_5)	4.00%
Potash from Sulfate (K_2O)	8.00%
SECONDARY NUTRIENTS:	
Calcium (Ca)	6.00%
Magnesium (Mg)	1.20%
Sulfur (S)	14.00%
MICRO-NUTRIENTS:	
Copper (Cu)	0.05%
Total Iron (Fe)	0.28%
0.03% Chelated Iron (Fe)	
0.25% Fritted Iron (Fe)	
Manganese (Mn)	0.05%
Zinc (Zn)	0.05%

DENSITY: 65 = per Cubic Foot
SCREEN SIZING: 90% Minus 8 Plus 20 Mesh Sieve
COLOR: Gray
REGULAR PACKAGE: 50 = Multi-Wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene
POLYETHYLENE PACKAGE: 50 # 2 Ply Polyethylene 9 Mil Thickness

Fall Fairway Fertilizer

This quality product is ideal for fall fairway fertilization because it has a high *potash* analysis...and that means less winter kill. Potash works to toughen the grass giving the turf healthy and hardy leaves that can better withstand the cold winter weather. Potash also helps fairways resist disease problems such as dollar spot and brown spot.

This fertilizer is formulated with primary nutrients specifically for your area. Consult your local distributor.

Vertagreen for Professional Use 15-5-5 with Dacthal®

NEW

GUARANTEED ANALYSIS

PRIMARY NUTRIENTS

Total Nitrogen (N)	15.00%
Available Phosphoric Acid (P_2O_5)	5.00%
Soluble Potash (K_2O)	5.00%
SECONDARY NUTRIENTS	
Calcium (Ca)	1.00%
Sulfur (S)	8.00%
HERBICIDE: Dacthal*	2.31%

DENSITY: 65 # per Cubic Foot
SCREEN SIZING: 80% Minus 8 Plus 20 Mesh U.S. Sieve
COLOR: Gray
REGULAR PACKAGE: 50 # Multi-wall 4 Ply, 3 Ply Paper, 1 Ply Polyethylene

*Use as a pre-emergence herbicide under U.S. Patent No. 2,923,634. Diamond Shamrock Corporation.

Dacthal is registered trademark of the Diamond Shamrock Corporation.

Nutrients and USS Vertagreen

The key to a successful turf program is the correct use of vital primary, secondary and micro-nutrients. The USS Vertagreen product line is designed by USS Agri-Chemicals agronomists to meet most needs with a correct formulation of these important nutrients which include:

N NITROGEN is a primary nutrient that gives plants a dark green color, vigorous blade and root systems and feeds soil microorganisms. All growing things must have nitrogen to survive.

P PHOSPHORUS, a primary nutrient, stimulates early root formation, gives a rapid start, hastens maturity, improves winter-hardiness and improves disease resistance.

K POTASSIUM, also a primary nutrient, is a "winterizer" that increases vigor and disease resistance, stiffens leaves and forms starches. Sulfate of Potash is used in USS Vertagreen turf grades because it has a lower salt index and is far less likely to burn.

Mg MAGNESIUM is a secondary nutrient that forms chlorophyll and sugar, carries phosphorus and corrects soil acidity.

S SULFUR, another secondary nutrient, maintains a plant's dark green color, encourages growth and corrects soil alkalinity.

Fe IRON is one of the most important micro-nutrients. It promotes chlorophyll production and is provided in two forms:

Fritted—glass-like materials giving slow but continuous release.

Chelated—chemically activated to prevent iron from binding with phosphate. Fritted iron is ideal for acid soil conditions, while chelated iron is more suitable for alkaline soils. A combination of these two sources in USS Vertagreen will supply the plant needs for iron over a wide pH range.

SPECIAL GRADES

There are many special regionally formulated N-P-K grades and direct application materials such as USS Ammonium Nitrate, USS Ammonium Sulfate, Sulfate of Potash and others available upon request. See your USS Vertagreen Turf Care distributor for special grades in your area.

Vertagreen
Turf Products

USS Vertagreen products are formulated and packaged by USS Agri-Chemicals, a division of United States Steel. The USS Vertagreen line is designed by USS agronomists to meet every need and contingency. Use these products consistently in a carefully planned program and you avoid erratic feeding and spotty results. The USS Vertagreen turf team can help—with soil tests, advice and technical support every step of the way.

UREA-FORMALDEHYDE FOR LASTING GREEN

Half of the nitrogen in USS Vertagreen Tee Green formulations and a minimum of 25% of the nitrogen in our fairway fertilizers is in the form of urea-formaldehyde (UF). UF is an important element in a well planned turf program because it assures a sustained high-nitrogen level when used consistently.

BACTERIAL ACTION

The nitrogen in UF is released by bacterial action that increases as soil moisture and temperature increase. The changes which increase this bacterial action are also the changes which stimulate turf growth. Consequently, UF releases nitrogen to support the accelerated growth activity at the time the turf needs and can use it!

LESS WASTE

Since the nitrogen in UF is held in reserve until the turf can use it, nitrogen lost through leaching is kept to a minimum.

UF gives USS Vertagreen a stability not found in slow-release fertilizers that rely entirely on moisture to trigger nitrogen release. These fertilizers can be seriously depleted by a period of wet weather, regardless of soil temperature.

BUILDING NITROGEN LEVELS

The first year you apply USS Vertagreen, the UF releases 60% of its nitrogen; 25% the following growing season and 15% the third season (See chart). The result is a steadily growing nitrogen level in your soil and a consequent need for less chemical nitrogen each year until the maximum level from UF is reached in the third year.

COMPLETE IN SECONDARY AND MICRO-NUTRIENTS

Secondary and micro-nutrient deficiencies are most common in sandy soils or muck, but can occur in virtually any region and soil type. Shortage of any of these elements can have a marked effect on growth and color.

Most USS Vertagreen turf fertilizers, regardless of NPK content, deliver a uniform balance of secondary and micro-nutrients in a slow-release form.

CONTROLLED RELEASE OF IRON

Iron is one of the vital elements in the chlorophyll molecule. When iron is deficient or in an unavailable form, as is often the case in alkaline soils or where phosphate levels are high, the turf loses color and growth is stunted.

Direct application of a water soluble iron salt is not usually an effective remedy in the long run because iron in that form quickly links with phosphates in the soil and becomes unavailable to the turf.

USS Vertagreen provides usable iron over an extended period by including iron in chelated as well as fritted form.

Chelated Iron

Is chemically buffered to prevent the iron from linking itself to the phosphates in the soil.

Fritted Iron

Is a glass-like material which gives a slow, but continuous release of iron. The slow rate of release helps retard soil fixation of the iron, and at the same time furnishes iron for the turf over a longer period than is the case for readily soluble iron compounds. Fritted iron does a better job of furnishing iron under acid soil conditions, whereas chelated iron is more suitable for alkaline soils. A combination of the two sources will supply the plant needs for iron over a wide pH range.

DEVELOPMENT OF RESIDUAL NITROGEN IN THE SOIL

YEAR			
1.	1st YR. U.F.	CHEM. N.	
2.	2nd YR. U.F.	1st YR. U.F.	CHEM. N.
3.	3rd YR. U.F.	2nd. YR. U.F.	1st YR. U.F.
4.	4th YR. U.F.	3rd. YR. U.F.	2nd YR. U.F.

Chart shows how identical applications of USS Vertagreen with UF build the level of slow-release nitrogen in the soil.

Agri-Chemicals
Division of United States Steel
P.O. Box 1685 Atlanta, Georgia
(404) 572-4132

tegrated plan. The turfgrass breeder, engineer, chemist and practitioner must consolidate their knowledge into a program which can be considered low maintenance and yet impressive from a quality standpoint. Since these factions have operated independently for the most part, a new panel approach must be organized. One way to start would be to select one golf course, one park, one shopping center, one office plaza, one cemetery, and one highway right-of-way to implement all known labor and energy saving technology. Since associations are mainly concerned with specific fields, this coordinated program would most likely be taken on by a state university.

Of course, individual superintendents and turf managers could implement a combination of labor and energy saving methods at their facilities.

Some of these methods are included in the following description of progress in specific turf areas.

Aerifiers

The original aerifier was designed to be pulled by a tractor. It used a series of spoon-shaped rods attached to a central axle to pierce the soil. Soon afterward a gasoline powered aerifier was developed, both of these firsts came from West Point Products. Today, this technology is the property of Hahn. Other methods of coring were developed to reduce the unsightly appearance of cores remaining after aerifying. Hollow rods attached to a drum and dragging after aerifying are examples. Dedoes, Cushman/Ryan, Jacobsen, Toro and Turfco have all included aerifiers in their turf lines. Cushman makes one model that uses rows of upright rods to alternately punch the surface of greens.

Soil modification through topdressing is regaining strength as a turf practice. Aerification and sand topdressing offer potential for golf as well as other turf uses. The role of well-aerated soil in disease, compaction and irrigation efficiency is being rediscovered. Its role in *Poa annua* control is being restudied.

A drawback to the aerifier is its infrequent use. An aerifier attachment for a tractor may be more sensible on a cost basis. The multi-use turf tractor may be a key factor in equipment efficiency in the future.

Drainage

Proper site preparation makes

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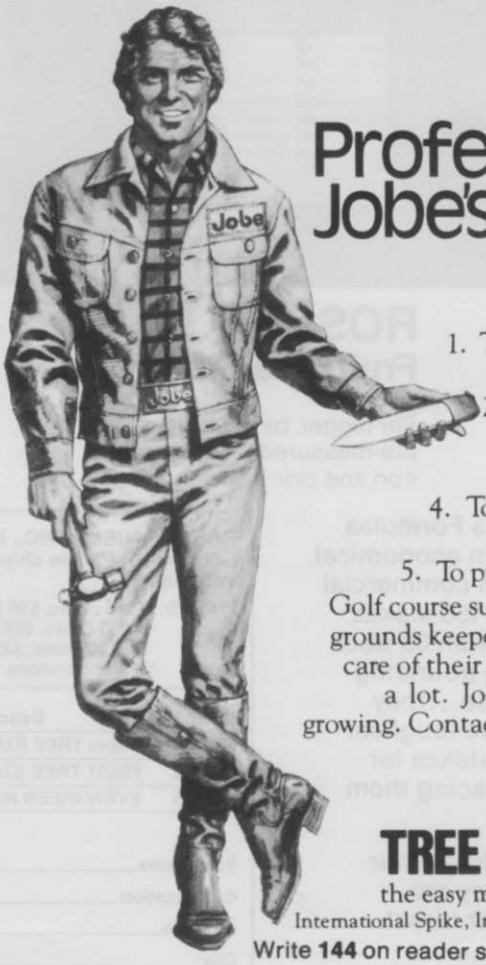

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correctional drainage unnecessary. On the other hand, improvements in trenchers and the development of flexible plastic drain tubing have greatly reduced site disturbance and installation cost. Very few good farmers have yet to tile their fields. Turf managers should follow suit realizing the installation cost can be recouped in better drained and playable turf. Drainage also provides the manager with better control over the environment of the turf. Excessive surface moisture encourages disease and *Poa annua*. A savings in fungicides and herbicides is a possible result.

Fertilizers

The most recent development in fertilizers has been liquid formulations of ureaformaldehyde. Sulfur-coated urea preceded liquid UF.

The latest intent of chemical manufacturers has been to provide convenient nitrogen sources for applicators of liquid materials for turf, primarily the lawn care market. Their developments could be applied to fertigation, an area of large potential for well-irrigated turf areas. Liquid lawn care to golf courses has not proven practical so far.

Granular fertilizers remain the dominant nitrogen source. Some dry materials are available in a form suitable for liquid application.

Slow-release fertilizer technology currently exists which enables managers to reduce the number of seasonal fertilizer applications.

Combining fertilizer with insecticides and herbicides to reduce the number of applications is desirable. Large users may economize by buying quantities of individual chemicals and mixing them. This is simpler in liquid form. Buying custom blended dry products is less economical. Distribution of dry materials from broadcast spreaders may not be even if particle sizes and weights vary considerably.

Guidelines to mixing various dry materials to consolidate applications would be well received.

Growth Regulators

If you remember that growth regulators were actually the materials used to develop herbicides from, you wonder why they haven't progressed more than they have. Scientists have worked decades to reduce the yellowing effect of most growth regulators on turf. Managers of fine turf still hesitate to use them. Establishing low maintenance areas will encourage the use of growth retardants for roughs, roadsides, and parks.

Herbicides

The biggest headache in selective weed control remains grassy weeds such as yellow nutsedge and *Poa annua*. Basagran is registered for nutsedge but must be used with care to prevent burning desired turf.

Some specialists say we create our own weed problems with excessive fertilization and irrigation. Adjusting these maintenance practices should then help.

Properly timed use of preemergence herbicides certainly reduces postemergence treatments. Weed control is one of the areas that can benefit the most from integrating management practices. Keeping a good eye on the turf to identify problems early is advised, as is eliminating adjacent weed seed sources. Renovating a nearby field to tall fescue may be cheaper than endlessly fighting airborn weed seed. Hand removal of a few isolated weeds may eliminate the need for large area treatment later.

EQUIPMENT

National Mower Company

The historical flavor of the mower market can be sensed from the background of the National Mower Company of St. Paul, Minnesota, and its founder Robert Stanley Kincaid.

Kincaid received his degree in mechanical engineering from Purdue University in 1908. He grew up in Kentucky and appreciated the beauty and needs of turfgrasses. Kincaid's father became ill at the time of Stan's graduation and was hospitalized in Rochester, Minnesota. Since he hadn't yet taken a job, Kincaid decided to look for work in the Rochester area. He took a trolley to Minneapolis. When the conductor asked for additional fare he got off to look around. He noticed a manufacturing plant across the street and decided to check the company for job opportunities

Although he was an engineer, he accepted an apprenticeship at the plant for $1.25 per day. That company was Gas Traction Company, the first manufacturer of gasoline powered tractors in the world. Engineering developments there were applied to nearly all gasoline tractors to be built in the next 20 years.

Kincaid later worked in cooperation with John Deere, the early founders of Toro, and Briggs & Stratton. The northern central states were a hotbed of gasoline powered tractors in the teens. In 1916, a demonstration of tractors from Ford, International Harvestor and others was held in Nebraska. The conversion from steam to gasoline was now certain.

At this same time Kincaid began experimenting with gasoline-powered reel mowers. He developed a 40-inch mower for estates and helped solve early engine lubrication problems. All efforts were directed at war for the end of the decade.

In 1921, two years after he returned from the war, Kincaid began making small numbers of gasoline-powered mowers. He always resisted fancy and unnecessary cowling and concentrated instead on the engineering strength of his mowers. Gradually he built up production and his son John joined him.

Today, National makes some of the most rugged riding reel mowers in the business. These mowers had their origins with Toro's Bull Tractor and continue to play a growing role in mowing of fine turf. Kincaid strongly believes in doing a few things well rather than many things poorly.

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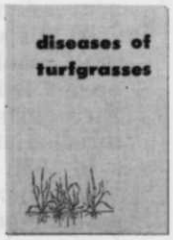

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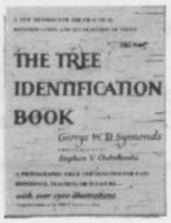

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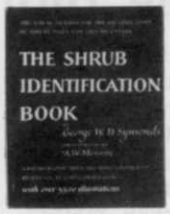

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Irrigation

Many turf specialists are suggesting irrigation has been misused, especially in the north and northeast. Battles with *Poa annua* , bentgrass in a stand of bluegrass, and turf disease are thought to be related to misuse of water. Much research on healthy irrigation levels for turf is needed. The practicality of using irrigation systems for chemical applications needs to be considered more seriously. This might well be a reason to install or upgrade an existing irrigation system since coverage would be critical for such use. Wetting agents may be one of those chemicals applied to improve the utilization of water by the turf.

Use of effluent or even city water may prove more economical than drilling a well or building a lake. In some areas, an extra meter can be installed on the system and sewerage treatment fees deducted from the water bill. If use is limited to necessary times water use can be curbed.

Mowers

Hydraulics have gained a strong position in the mower market. Original resistance caused by extra maintenance for hoses and pumps is being overcome. Use of larger mowers is more practical due to hydraulics. Transporting large mowers no longer requires stopping the mower to pick up side units.

Hydraulics have helped the use of flail mowers for turf. Manufacturers offer fine edged blades for flail mowers. Benefits are said to be reduced blade sharpening and adjustment.

Hydraulic reel mowers offer an alternative to PTO driven versions or wheel driven versions. Gangs provide the extra flexibility of freeing the tractor for other jobs. Rotaries remain the modern workhorses due to high maneuverability and low maintenance. Hydraulics have eased some of the problems with belts on rotaries.

The sickle bar mower has slowly faded into almost strictly agricultural use.

Seeders/Spreaders

The technology of seeders and spreaders has not abandoned the drop spreader, although broadcast and hydraulic seeders are dominating commercial use.

Convenience of size and speed often outweigh the accuracy of the drop spreader. Broadcast spreaders throw a wide swath of material in a short time. Distribution is less uniform, however. Large broadcast spreaders have greatly increased the practicality of topdressing with sand.

The hydraulic seeder quickly solves large seeding jobs. The seed can be applied with the fertilizer and mulch at one time. Blowing straw becomes unnecessary. Seeding rates are higher but instant protection against weather is provided and the job is completed quickly. Mulch quality must be carefully watched. Always use the well-known brands to avoid problems.

Verticutter

More aggressive Kentucky bluegrasses have increased the need for vertical mowing. Increasing popularity of overseeding and topdressing also encourages the use of vertical mowers. Like the aerifier, the verticutter is used only occassionally. Combined with turf vacuums, verticutting can be a fairly quick form of turf improvement. Verticutting large areas remains a

EQUIPMENT

The Toro Company

Toro began as the Toro Motor Co. in 1914 when the Minnesota-based operation was commissioned to build engines for a manufacturer of farm machinery. It turned from its agricultural orientation in 1922 when the golf course superintendent of a local course suggested the company design a tractor-towed gang mower for fairway maintenance. By 1925 Toro turf maintenance machines were in service on nearly every major golf course in the country and on parks and large estates as well.

Toro produced its first power mower for residential use in 1939 but it was not until 1945 when it began to move into the home lawn market. Through a combination of acquisitions and research and development Toro began to expand operations around the country. Plants now exist in Bloomington, Windom, Shakopee, Fairmont, and Willmar, MN; Tomah and Hudson, WI; Riverside and San Marcus, CA; Columbus, OH; and Mason City, IA.

The company entered the rotary mower market with the purchase of Worldwind Inc. in 1948. Soon after Toro developed its wind tunnel housing, a major step in its technological growth. Toro was the first manufacturer to develop a mower with electric starting, the first to offer a rotary lawn mower with a bagging attachment, and led the way in establishing safety features for mowers.

Toro entered the snow thrower market in 1951, a major step in transforming the company from a seasonal business to a year-round supplier. It pioneered the development of compact, lightweight snow throwers and is now the leading manufacturer of snow throwers.

From snow equipment, Toro expanded into the irrigation field with the purchase of Moist O'Matic in 1961. Toro made extensive use of plastic in place of metal for irrigation equipment. Other innovations in irrigation include valve-in-head sprinklers, rotary gear driven sprinklers capable of sending a stream of water a diameter of 150 feet, pop-up pop-down sprinkler heads which virtually eliminate vandalism, and vibration-free easy-to-service sprinkler heads for all types of farm irrigation.

In 1979, Toro entered the lawn care service with the acquisition of Barefoot Grass, Columbus, OH. Its consumer yard care line which included both rider and walk-behind mowers has been broadened in recent years to encompass tillers, lawn debris pickups, flexible line trimmers, garden hoses, chain saws, and other outdoor appliances.

Toro's line of turf maintenance equipment ranges from a 21-inch walk-behind rotary mower to the giant HTM 175 that operates up to seven reels hydraulically and mows up to 80 acres a day. A total of 56 distributors in the United States and 56 in the rest of the world distribute Toro products.

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For home lawn use, institutional, parks...university studies from Winnipeg, Canada to Maryland have consistently rated Jamestown number one in overall quality for the past five years. Jamestown broadens the adaptation of bluegrasses because of shade tolerance and lower fertility requirements.

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Jamestown is ideally compatible in persistence and color to the new Kentucky Bluegrasses such as Baron and Majestic. It s natural low and dense growth combined with its deep rich color makes Jamestown the number one fescue for use in the sod industry.

GOLF COURSES...
In the temperate climates Jamestown should be used for seed mixtures on tees, roughs and fairways. While in the Bermuda belt Jamestown is the best fine leafed fescue for fall overseeding greens. A Clemson University study showed that Jamestown is outstanding at a cutting height as low as 1/8 inch.

Remember. . . *Jamestown is particularly useful where turf conditions are less than perfect. It does very well in non-irrigated and somewhat infertile soils where the turf may be subject to adverse conditions on low maintenance budgets.*

Showing a sample of Jamestown, is Dr. C. Richard Skogley, world renowned turf grass agronomist and researcher at the University of Rhode Island where Jamestown was developed.

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Jim Loke, Firestone Country Club
Akron, Ohio

"What I'll use in the future."
John Monson, Broadmoor Golf Club
Seattle, Washington

"Effective against leafspot."
Warren Stringer, Bent Tree Country Club
Dallas, Texas

"Eliminated dollar spot."
Robert Williams, Maidstone Club
East Hampton, N.Y.

ord from the guys that count.

Larry Bunn noted, "we controlled dollar spot and brown patch with two applications." And Chris Myers of Bloomfield Hills C.C. said that Chipco 26019 controlled dollar spot "longer than any other fungicide he used last year."

This season, ask your Chipco distributor or Rhône-Poulenc representative about Chipco 26019...the turf fungicide that outperforms anything else you can use, with about half the number of sprays. Who says so? *You, the turf care professional.* And as far as we're concerned, that's the last word.

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time consuming job. Hydraulic drive could make larger units more practical than in the past.

The Future

Managers of valuable turf areas in the future will face a complex set of considerations for problems that used to seem simple. Efficiency, application rates, chemical/biochemical interaction, water consumption, water content, precise rootzone condition and drainage control will be cross-checked for exact corrective measures. Turfgrass cultivar, disease organism identification, and soil chemistry would be the least number of factors to be considered and they would have to be considered in greater detail than today.

A computer may be required to manage the number and complexity of details for turf management. Research data bases will be developed by universities and large associations. Test results will be inputted by minicomputer at the site and transmitted via telephone for evaluation and recommendations. Demographic data will customize the answer for the computer user.

Bill Lyons, *former superintendent of Firestone Country Club in Akron, Ohio, and now owner of Lyon's Den Course, continues to apply 50 years of turf knowledge to the game of golf.*

Such programs exist in simplified form today. Soil test facilities in Wooster, Ohio, provide a computer printout of recommended application rates for nitrogen and all other elements, including pH correction. The professional provides a soil sample and fills out a card listing type of turfgrass or tree, whether the sample is preplant or postplant, and county. The results from the lab are sent to the county extension turf specialist for filing and for delivery to the sender. If additional information is needed, the person can call the extension agent and he will have a record of the soil sample. Based on this information he can make fairly accurate recommendations in addition to those on the printout. This service costs less than $10 per sample.

In this fashion many more factors can be considered and processed through the extension agent or association technical specialist. One problem with this system is the two to three-week turnaround time. Direct access to a data base could provide instantaneous results. Access to the computer could be limited to subscribers of a system by a minicomputer which is programmed to communicate with the central processing unit.

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Goodall mowers are built to last. All engines used on Goodall's are chosen with the same intentions. One winning combination is the 8 hp, 2-cycle JLO engine on the rugged, dependable 36 inch Goodall mower. In fact, over 60% of the Bunton built 36 inch units sent to Europe last year are JLO powered.

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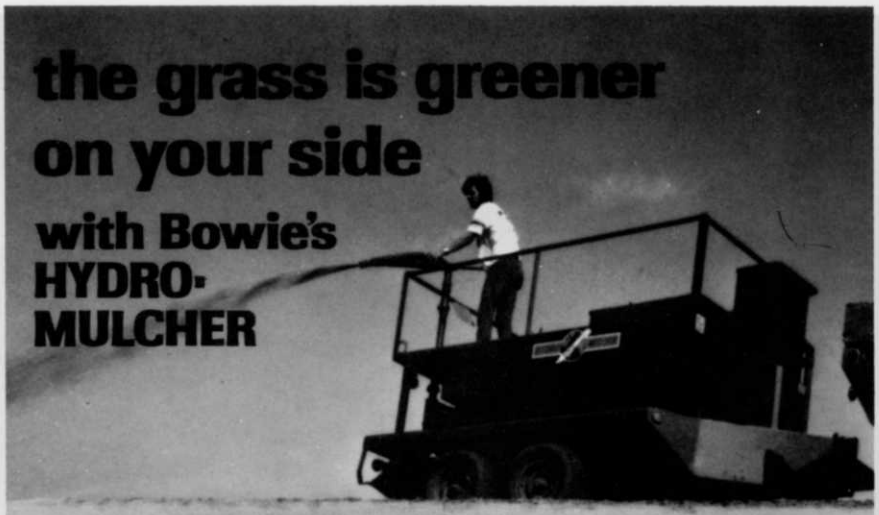

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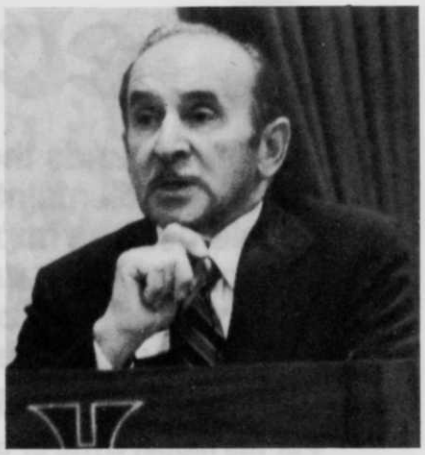
Although it may sound like a great deal of money, $6,000 for a minicomputer is not excessive if it can help prevent the loss of a green before a major tournament, or the failure of a large seeding installation by a landscape contractor. The cost to the university or organization for the central processing unit is higher, it could be paid by subscriptions from users.

Another use for the computer is the implementation of integrated pest management programs. IPM can be very complicated if you fully consider chemical controls, biological controls, and site conditions. Natural predators for disease hosts and damaging insects are not well understood at this time. Since the Environmental Protection Agency is behind the implementation of IPM, perhaps it can supply data base needs to extention agents. Regulating IPM would be nearly impossible without computer assistance.

To really get control of chemical use by agriculture and turf, not that it is out of control, EPA will have to provide practical solutions and assistance in addition to enforcement. And, rather than building local bureaucracies with EPA control support of the existing extension service should be mandated. Extension specialists know the industries whereas EPA agents know only enforcement of rules. They too often misinterpret local uses due to vague national standards. For the Special Local Needs program, EPA has rightly sought the assistance and advise of Land Grant universities, the very source of information for extension agents. There may be a case for integrated government management.



Al Radko *has directed the USGA Green Section for the last two decades. He has edited the Green Section Record during that period.*

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Solid state technology, already employed in irrigation, can be extended to other turf uses. Moisture sensors let the controller know irrigation is unnecessary after rain. Soil temperature sensors may indicate that syringing during hot weather is unnecessary. Phone communication with controllers can eliminate or change cycles. The uses of computers are limitless.

Use of infrared photography to indicate water or disease problems in turf may play a part in the future. Perhaps subtle differences in temperature of turf areas may pinpoint problems before they become detectable to the eye.

Effluent water (partially treated)is a good example of integrated management. It solves the turf managers problem with water costs and helps the sewerage department safely distribute water not needed for domestic or other industrial use. Wastewater control is another function, the biggest, of EPA. Its support for use of effluent for turf would help speed up conversion.

Growth regulators and water conditioners have a major role to play in the future. So does native material, such as wildflowers and prairie grasses. Here again, proper use depends upon full consideration of cost and site conditions. The benefits of lower maintenance products suffer-from lack of comparison with alternatives. By planting native materials, mowing may be eliminated, but that doesn't eliminate the need for other maintenance to the right-of-way such as trash removal, fence repair, and shoulder maintenance. Maintenance based upon these other needs may be adequate for mowing less expensive grasses.

By improving turf maintenance technology we have uncovered new problems and raised new questions. Assembling data on all aspects is possible with the computer. In the future the computer will eliminate much of the doubt about modern methods, contribute to the sophistication of the industry, and prevent unnecessary losses caused by lack of information. **WTT**

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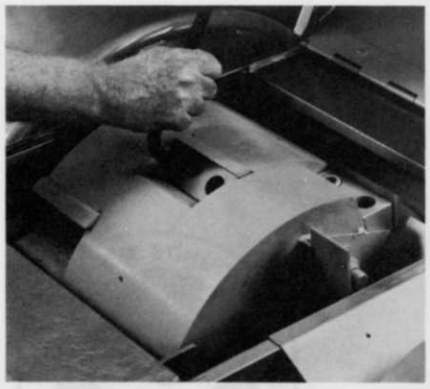

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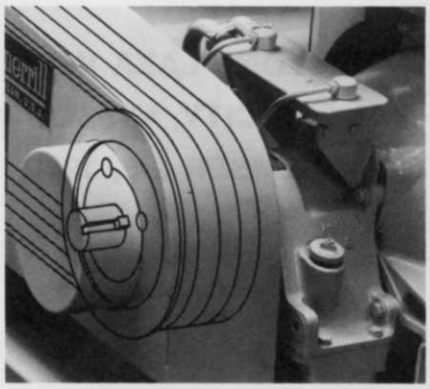

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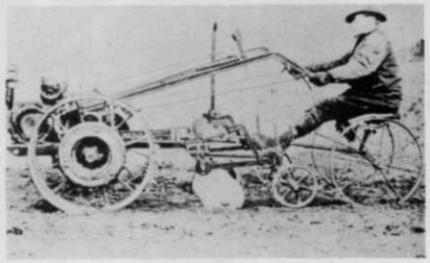

Sulky reel mower *at Mount Vernon, Virginia, in the early 50's (top).* **First riding garden tractor** *was designed by Bolens in 1931 (bottom).*

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Yes, here's another place you'll find Regal perennial ryegrass. Its dark green color and improved disease resistance contributes to the healthy looks of the newly rennovated grounds at the St. Louis Arch.

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0-1196

VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: *What would you recommend as a good general herbicide for floating and submerged weeds in a pond?*

A: Diquat and Aquathol are both recommended. I have not tried Aquathol, but have had good results with Diquat.

A: *What turfgrass would you recommend for a low maintenance area where irrigation cannot be provided during drought periods?*

A: Fine fescues are usually preferred in your area (northeast) although tall fescue also has good drought tolerance and will tolerate heat better than any of the other cool-season turfgrasses.

Q: *What effect will Prime-a-Pell, a washing solution for buildings, have on plants? We maintain the plants around a building which is scheduled to be cleaned this summer.*

A: I called Chemprobe Corp., manufacturers of the product, and was told that the petroleum-based solvents would have the same effect as gasoline. Their label states to protect plants and painted surfaces.

Q: *How deep must a fill be before it will injure trees?*

A: I would not attempt to even guess at a safe fill depth because of the number of variables that are involved in determining injury. Not only is the type and depth of soil important, but also the species, age, and condition of the trees.

Tree roots develop at certain depths in the soil because the oxygen level and other soil factors will support growth. If fill alters the soil environment, anaerobic conditions may result in root injury or death. Clay soils have the greatest potential for injury and reportedly have resulted in the death of sensitive trees at a fill depth of one inch.

Q: *Which ground covers are recommended for areas too shady to grow turfgrass in the Northeastern area?*

A: English ivy *(Hedera helix)*, periwinkle *(Vinca minor)*, wintercreeper *(Euonymus fortunei)*, and Japanese spurge *(Pachysandra terminalis)* are recommended for shady areas.

Continues on page 64

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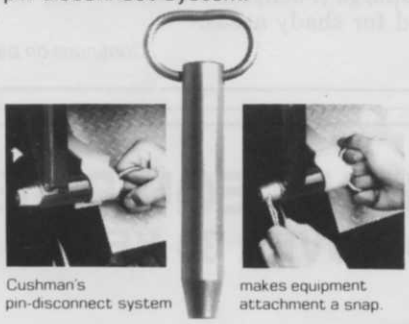
In the fight against inflation and rising labor costs, you can't win with foot soldiers. You need to get your crew rolling with the Cushman® Turf-Care System.

At the heart of our labor-saving system is the Cushman 3- or 4-wheel Turf-Truckster® vehicle. Powered by a rugged, air-cooled 18-hp OMC engine, the Turf-Truckster moves people, tools and equipment quickly and economically. And recent improvements help this year's Turf-Truckster deliver 50% greater payload capacity.

But what has made Cushman a world leader in turf maintenance vehicles is our full line of optional attachments, designed to handle many of your most important turf jobs. All are designed expressly for the Cushman Turf-Care System. And all are interchangeable—in minutes—thanks to Cushman's pin-disconnect system.



Cushman's pin-disconnect system makes equipment attachment a snap.

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The Greensaver teams up with either the 3- or 4-wheel Turf-Truckster to aerate greens, tees or other turf areas up to 10 times faster than walk-type units.

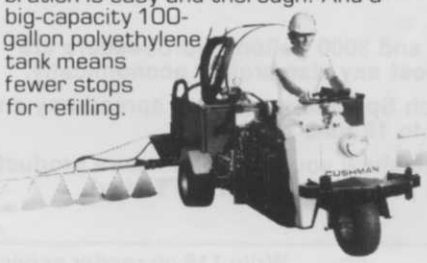
Choose the drum best-suited to your turf: 1/2" coring tines, 3/8" coring tines or slicing tines—all interchangeable within the system. What's more, both coring drums collect cores as you aerate, or remove the side plates and return the cores to the turf to be broken up as top dressing.

SHORT BOX & FLATBED/BOX

Your Turf-Truckster becomes a flatbed hauler with just two pull pins in place. Bolt on the optional side panels and tailgate to the flatbed, and you have a 1,500 pound capacity* box that can be dumped manually or hydraulically.

SPRAYER

Outfitted with optional 15' boom and handgun, this attachment is ideal for spraying greens, trees, bushes or roughs quickly and accurately. Powered by the Turf-Truckster vehicle's optional PTO, and equipped with ground speed governor, calibration is easy and thorough. And a big-capacity 100-gallon polyethylene tank means fewer stops for refilling.



TOP DRESSER

Compared to self-powered or walk-type top dressers, this unit quickly pays for itself in saved manhours. A rubber fabric moving bed and rotating brush are matched to the vehicle's ground speed governor for an evenly spread 31 1/2" swath. The clutch control, to engage spreader, is conveniently located to be operated from the driver's seat. And the hopper holds up to 1,000 pounds of material from rock salt to powdered fertilizer.

your work force rising costs.

QUICK AERATOR

With its 46″ swath, this attachment earns its name by finishing big aerating jobs fast. By hydraulically lifting it into transport position from the driver's seat (optional hydraulic system and dump set required), you can move quickly from job to job, too. Choose from three tine styles: slicing, coring (2 sizes) and open spoon.

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*Rating for vehicle equipped with 9.50-8 rear tires.

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Mounted on the optional Short Box or Flatbed/Box, its cyclone action broadcasts as much as 300 pounds of seed, fertilizer or other material over a 40′ wide area. The Spreader/Seeder is powered by the Turf-Truckster vehicle's optional PTO with extension shaft. And the controls are operated from the driver's seat.

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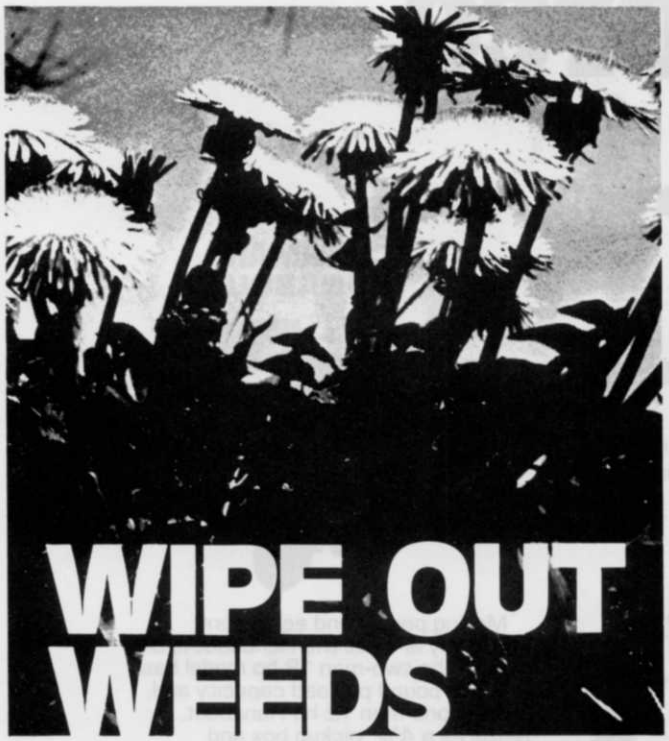

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Banvel herbicides—products for professional turf men

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Vegetation Management

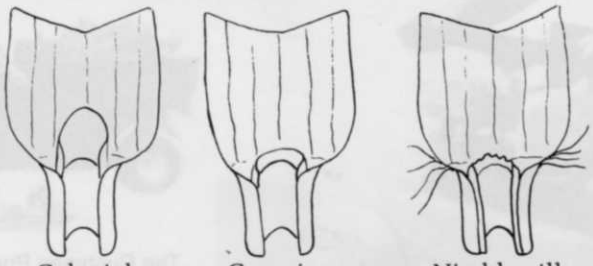
from page 61

Q: *What material can be used as a mosquito repellant on humans?*

A: Commercial preparations containing diethyl-m-toluamide, diethyl phthalate, or diethyl carbate are the most effective. Outer garments can be treated with a preparation of one ounce benzyl benzoate (from drug store) to three pints water. Saturate all parts of the clothing, wring lightly, and dry thoroughly before wearing.

Q: *What is the best way my men can tell nimblewill from bentgrass in clients' lawns?*

A: Both nimblewill and the bentgrasses have a membraneous ligule. However, the ligule for nimblewill is short and jagged. Also, nimblewill has long hairs at the edges of the collar.



Colonial Bentgrass — Creeping Bentgrass — Nimblewill

Q: *I have noticed that Bordeaux is gradually being replaced by other fungicides in most disease recommendations. What does Bordeaux contain and is it losing its effectiveness?*

A: Bordeaux mixture is a mixture of copper sulfate and hydrated lime in water. The ratio is one pound copper sulfate, three pounds spray lime, 50 gallons water.

Bordeaux is available as a dry wettable powder and is more effective against many diseases but is being replaced with safer materials because of problems with plant injury and compatability with other pesticides.

Q: *What pre-emergent chemical can I use to control weeds in a bed that contains English ivy, pachysandra and myrtle?*

A: The three ground covers you listed are tolerant to Betasan, Eptam and Ronstar.

Betasan is effective on annual grasses, especially crabgrass. Eptam will suppress nutsedge, quackgrass and certain broadleaf weeds, although it will not give as long-lasting control as many other herbicides. Ronstar will control many annual grasses and broadleaf weeds.

Read the labels for more specific information, including application instructions.

Send your question or comments to: Vegetation Management c/o WEEDS TREES & TURF, 9800 Detroit Ave., Cleveland, OH 44102. Leave at least two months for Roger Funk's repsonse in this column.

LOW MAINTENANCE, HIGH TOLERANCES MAKE LINDENS GOOD CHOICE IN CITIES

By Douglas Chapman, Horticulturist, Dow Gardens, Midland, MI

The lindens *(Tilia)*—American, Little-Leaf, Silver, and Mongolian—are exciting as street, park, large area, or home landscape trees with each being outstanding when grown in optimal situations.

The native **American Linden (Basswood)** *(Tilia americana)* has a range from Alaska through the Great Plains of Canada, southward to North Carolina. It is found growing in many sites but prefers deep, rich, fertile soils with a relatively high percentage (35) of silt and clay. Basswood thrives in full sun but will tolerate partial shade. It is resistant to drought and tolerates salt spray and chloride applications to the soil. The fast-growing tree reaches 70 to 90 feet in the landscape but can be found native over 100 feet in height. Its habit is pyramidal when young but becomes drooping and irregular with maturity. The 4 to 8 inch long coarsely serrated, somewhat heartshaped leaves are bright green during the summer, usually turning brown in the fall with little or no effective fall color. Its pale yellow, fragrant flowers of mid-June can be quite effective visually and they have a sweet aroma.

Basswood *(T. americana)* propagates easily by seed when acid scarified for 15 minutes and stratified for three months. Further, we find this tree propagates quite easily by cuttage (softwood).

American Linden is a large-area (park or golf course) specimen tree. It is a good companion when used with grass or pachysandra. Junipers, which are too aggressive for the American and Little-Leaf Linden, often lead to premature defoliation and/or death of these lindens.

Their diseases are minimal but anthracnose caused by *Gnomonia tiliae* often causes defoliation in late season under a moist condition. Lawn mower disease (basal hits) is most significant and heartwood rot is common. This tree is a poor compartmentalizer; thus, only small branches can be pruned off because large-branch pruning results in heartwood decay. Insects that top the pest list include aphids and mites. These sucking insects can become numerous during late summer, secreting a honeydew that produces a black, sooty mold on the foliage. Control is appropriate only when defoliation seems to be a problem.

The only cultivar of American Linden is 'Redmond' (To *americana* 'Redmond'). Although often listed as a cultivar of Crimean Linden, C. Lewis has suggested it would more appropriately be listed as a cultivar of American Linden. I feel that the habit of growth is more characteristic of American Linden. It is a good street tree and grows extremely well in the largest cities of Michigan. 'Redmond' Linden grows aggressively and tolerates chlorides (sodium and calcium chloride), compacted soils, and urban stresses, making it outstanding as a street tree in areas with a large out-lawn. Longevity of this tree — more than 40 years — presently seems acceptable.

Little-Leaf Linden *(T. cordata)*, a European native, is effective when used on golf courses, parks, or home landscapes, and is outstanding as a street tree. Its leaves are 1½ to 2 inches long and finely serrated with a dark green summer color. This gives a much finer texture to the plant than is displayed by American Linden. Fall color can be an attractive yellow, although it doesn't develop every year. Its habit is densely pyramidal when young and becomes a dense, upright oval, reaching 50 to 60 feet in height and maturity. Little-Leaf Linden transplants readily into rich, moist, somewhat compacted soil and thrives in many cities. It tolerates salt (chlorides) and has been reported to tolerate most air pollutants, which makes Little-Leaf Linden the outstanding Linden for large cities. Of its several cultivars, 'Greenspire,' 'Chancellor,' and 'Rancho' are most desirable and available. 'Greenspire' *(T. cordata* 'Chancellor') is fastigiate when young, becoming pyramidal at maturity. It

Continues on page 66

A fine cultivar of Little-Leaf Linden, *Tilia Cordata* 'Greenspire' tapers neatly to a point when young and becomes pyramidal at maturity. Photo at left shows leaf of the Silver Linden (*Tilia tomentosa*), whose habit is similar to the Little-Leaf.

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Lindens *from page 65*

has been reported fast growing with good wide angle crotches. It seems to be the outstanding urban cultivar of Little-Leaf Linden in central and northern Michigan.

'Rancho' (*T. cordata* 'Rancho') is a small, upright oval in habit with small, glossy leaves but often doesn't develop fall color. It displays the finest texture of the Little-Leaf Linden cultivars.

Presently, Little-Leaf Linden cultivars are propagated by graftage or budding, but we have shown they can easily be propagated by cuttage (softwoods). I believe propagation by cuttage is the way many cultivars will be grown in the future. In fact, this should eliminate the graft incompatability which has been showing up with increased frequency.

Silver Linden (*T. tomentosa*) should be used more often. Its habit is similar to Little-Leaf Linden, becoming an upright oval 70 feet high at maturity. The leaves are 2 to 4 inches long and doubly serrated. The upper leaf surface is a dark green and the lower surface is a silver-green. When the wind blows, this tree gives one the feeling of Quaking Aspen. Because of the large leaf size, Silver Linden is coarser in texture than Little-Leaf Linden but exciting as a change of pace in the landscape. It is a good street or specimen park tree. It is reported by Dirr and Lewis to be drought tolerant. Silver Linden is perfectly hardy in Chicago, central and southern Michigan, throughout much of Ohio, and the East Coast, but for latitudes north of Gaylord, MI, it should not be considered. Silver Linden makes a good companion with grass as well as many ground covers, preferring full sun and tolerating only partial shade. As it becomes more widely known and available in the trade, it should play an increasingly important role in our urban landscapes.

Mongolian Linden (*T. mongolica*) is a small tree which is somewhat pyramidal when young, almost pendulous at maturity, and rarely reaches over 30 feet in height. Its 1 to 3 inch deeply-cut, almost lobed leaf makes it unique among the lindens. It has a relatively fine texture, shows good tolerance to most urban conditions, and should be considered for small area-home landscapes. With its unique leaf character and habit, it should become one of our major new small trees.

The lindens are certainly an outstanding addition to our urban landscapes. American Linden and its cultivar distinguish themselves as large area or park trees; Little-Leaf Linden is outstanding as a street tree; Silver Linden fills in well as a street or park tree; and Mongolian Linden is ideal as a home or small area landscape tree. These trees fit a unique niche in poorly-drained, heavy-silty soils. They thrive even under droughty conditions, and tolerate salt, air pollutants, and compaction. They will become more widely used due to their tolerances and relative freedom from catastrophic diseases. Considering the low maintenance requirements, linden's place of importance will increase. The one main precaution with linden is that they are poor compartmentalizers and lawn mower damage can easily result in heartwood or butt rot, but this is the main detractant of an otherwise outstanding group of urban trees.

WTT

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RAM I was found growing on the ninth putting green at Webhannet Golf Club in Maine. There it grew vigorously though consistently mowed at ¼". It was selected by Mr. Ernest W. Brown, superintendent, in consultation with Alexander M. Radko, National Research Director, USGA Green Section. The original plant was submitted to Dr. C.R. Funk at Rutgers University for further evaluation and testing. University testing proved this new variety to have superior qualities.

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RAM I Kentucky bluegrass is in no way connected with RAM of the Colgate Sports Groups of Companies.

News *from page 11*

stitute (OPEI) asked that the new standard be based on an existing industry voluntary standard, but the CPSC denied the request. A primary part of OPEI's argument was that the CPSC standard is a design, rather than performance, requirement.

The court did strike down one provision against which OPEI argued — the requirement for probing the discharge chute. The provision was backed up by only one injury incident in CPSC files.

GROUNDS

Grounds Mgmt. Society to meet in Kansas City

The Professional Grounds Management Society is holding its annual conference and trade show at the Hilton Plaza Inn, Kansas City, MO, on Nov. 3-4.

The Exhibit Hall will house the trade show and lounge area used for both coffee breaks and lunch. This will allow for full presentation of products to the grounds management industry. All lunches and coffee breaks will be held on the show floor.

For more information, contact Allan Shulder, PGMS, 7 Church Lane, Pikesville, MD 21208, 301/653-2742.

AQUATICS

Aquatic plant meeting updates weed controls

Talks on the white amur and hybrid grass carp, new chemical registrations for aquatic use, and mechanical treatments highlighted the annual meeting of the Aquatic Plant Management Society in Sarasota, FL.

Two hundred and thirty attended the July show which contained much discussion on biological factors for weed control, such as the white amur, sameodes moth, and a combination of insects and pathogens used to combat water hyacinth.

An update on Florida's use of the hybrid white amur was given and Donna MacKenzie from Ontario, Canada, spoke about the integrated approach used in her area. Dr. Eldon Blancher presented a paper on the use of mathematical modeling for aquatic management. Dr. M.J. Allen from England spoke on cell membrane work as it relates to chemical control.

Nelson Virden was elected president of the society for the coming year. He is owner of Virden Weed Control Service in Jackson, MS. Other officers elected were: Roy Clark, president-elect; Emory McKeithen, vice president; William Rushing, treasurer; William Haller, editor; and T.W. Miller, secretary.

PLANTS

Tissue culture is topic for October symposium

A symposium, "Propagation of Higher Plants through Tissue Culture", has been scheduled for the University of Tennessee, Knoxville, for October 12-15.

For more information, contact Dr. Karen Hughes, Department of Botany, University of Tennessee, Knoxville, TN 37916 (615/974-2256).

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WT&T PRODUCTS

Planting auger adapts in minutes to chain saw powerhead of 1.8 cubic inches or larger. International Reforestation Suppliers has built a

lightweight auger for use by one person. The rugged piece of equipment is available with 4- or 6-inch-diameter augers with carbide flighting and cutting edge.

Write 701 on reader service card

Model 35 drinking fountain, constructed of 10-gauge rolled steel and a green or bronzetone scratch-resistant epoxy finish, protects against vandalism. The Western Drinking Fountains product is guarded by ¼-inch plate steel, and the push button valve is recessed within the pedestal to further protect it. The 36-inch fountain suits playgrounds, parks, golf courses, and other areas.

Write 703 on reader service card

The Bradco Skid-Hoe from American Trencher, Inc. allows the operator to dig trenches 6 feet, 6 inches deep and 36 inches wide. It at-

taches to the bucket quick attach system of most skid-steer loaders. It is available in two models: a 6 foot, 6 inch digging depth unit for skid-steer loaders 30 horsepower and over, and a 5 foot, 8 inch digging depth unit for under 30 horsepower loaders.

Write 705 on reader service card

An electronic instrument, the DMI-Surveyor model IIS, measures linear distance or rate of motion while a vehicle is in operation. It easily attaches to a car, truck, tractor, motorcycle, or any ground vehicle. With an accuracy of 99 percent, it measures land parcels to figure requirements of seed, fertilizer, insecticides-pesticides, water, and other calculated factors. It gives a constant read-out of the current distances traveled, area covered, or the current rate of motion at all speeds from 0 to 100 mph. Distance Measurement Instruments, Inc. makes it.

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NEW NO DRIFT HERBICIDE APPLICATOR

The weed killer is applied to the ground by the ribbed roller right alongside borders with no possibility of drift onto shrubs and flowers. There is no waste. The herbicide is applied evenly and exactly where you want it. Models from 18" to 36" wide; 1½ to 6.6 gallons

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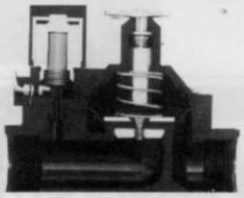
A one-step lawn mat, called Roll 'n Grow Lawns, applies grass seed, fertilizer, and straw mulch to provide a new turf. Action Lawns, Inc., the manufacturer, chops straw into short lengths and bonds it together with grass seed and starter fertilizer into either a 2 by 25 foot or 4 by 25 foot mat approximately ¼-inch thick. Seed mixes can be made to meet specific site needs.

When the mats are laid down on a prepared surface and watered, a bonding agent releases and helps bond the mat to the prepared surface. The straw protects the seed during germination and establishment and eventually breaks down to provide organic matter to the soil. The bonding agent deteriorates as the grass seeds take root.

Write 709 on reader service card

A 1½-inch plastic valve from WeatherMatic's 11024 Series is ideal for use in all types of sprinkler installations and water supplies. Low pressure loss helps efficiency. A brass flow control is standard. The glass-filled nylon body resists chemicals in the soil. Flexing inlet orifice in the diaphragm resists clogging and mineral build-up. Stainless steel cover bolts have mating brass body inserts for ease of reassembly.



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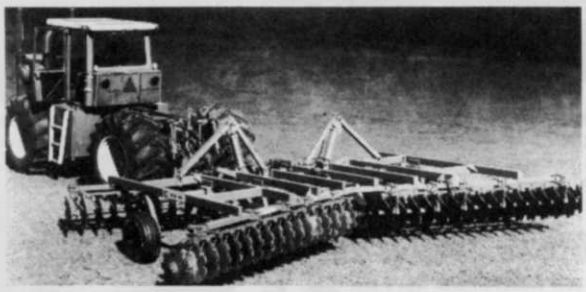
To prepare seedbeds and incorporate chemicals, Bush Hog's Model 1440 tandem disc harrow comes in over 100 variations to work most soils. Gang angles of 20 degrees front and 18 degrees rear with blade spacing of 7½ inches, 9 inches, or a combination of both, pulverize soil and level fields. Wings flex nine degrees up and down for thorough plowing on uneven ground. Spring-loaded balkbuster (center tooth) with 10-inch sweep levels any ridge left in the center by the front gangs to insure smooth, well-worked fields. Three hydraulic cylinders control depth and wing folding.



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Which means no wasted time waiting for a dealer to adapt attachments and less time lost when you need to change them on the job.

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Factory-trained Bolens dealers are part of a single supply system that gets you attachments and parts when you need them from strategically located, regional distributors.

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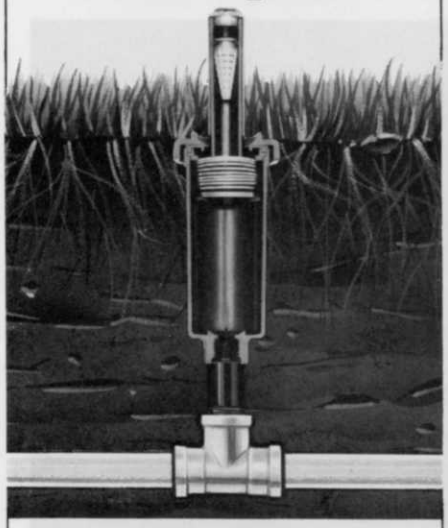

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WT&T

EVENTS

The current issue of WEEDS TREES & TURF carries meeting dates beginning with the following month. To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 9800 Detroit Ave., Cleveland, OH 44102.

New England ISA chapter meeting, Berkshire Hilton Inn, Pittsfield, MA, **Oct. 12-14.** Contact Ervin C. Bundy, ISA Executive Director, 5 Lincoln Square, P.O. Box 71, Urbana, IL 61801, 217/320-2032.

Symposium on Turfgrass Insects, Columbus, OH, **Oct. 14-15.** Contact Dr. B.G. Joyner, Plant Diagnostic Labs, ChemLawn Corp., 6969 Worthington-Galena Rd., Suite L, Worthington, OH 43085, 614/885-9588.

Southwest Turfgrass Association Annual Conference, New Mexico State University, Las Cruces, NM, **Oct. 16-17.** Contact Arden Baltensperger, New Mexico State University, Agronomy Dept., Box 3-Q, Las Cruces, NM 88003, 505/646-3138.

Pacific Northwest ISA chapter meeting, Jsutzen Beach Thunderbird, Portland, OR, **Oct. 16-17.** Contact Ervin C. Bundy, ISA Executive Director, 5 Lincoln Square, P.O. Box 71, Urbana, IL 61801, 217/320-2032.

California Council of Landscape Architecture Conference, Asilomar Conference Center, Monterey, CA, **Oct. 19-21.** Contact conference chairpersons Leah Maygood, 415/841-5154 or Deb Mitchell, 415/821-3500.

Twenty-Eighth Annual Conference and Show of the Florida Turfgrass Association, Gainesville, FL, **Oct. 19-22.** Contact FT-GA Executive, 1520 Edgewater Drive, Suite E, Orlando, FL 32804, 305/425-1581.

National Golf Foundation Annual Meeting, Wigwam, Phoenix, AZ, **Oct. 19-22.** Contact Don A. Rossi, Executive Director, National Golf Foundation, 200 Castlewood Dr., North Palm Beach, FL 33048, 305/844-2500.

National Recreation & Park Association Convention, Phoenix, AZ, **Oct. 19-23.** Contact Marge Westbay, Conference Coordinator, 1601 N. Kent St., Arlington, VA 22209, 703/525-0606.

Second National Irrigation Symposium, Nebraska Continuing Education Center, University of Nebraska, Lincoln, NE, **Oct. 20-23.** Contact Dr. Dale Heermann, USDA-SEAAR, P.O. Box E, Fort Collins, CO 80522, 303/221-0577.

68th Annual National Safety Congress and Exposition, Exposition Center, Chicago, IL, **Oct. 20-23.** Contact Congress Planning Dept., National Safety Council, 444 North Michigan Ave., Chicago, IL 60611.

Green Industry Seminar and Trade Show, Michigan State Fair Grounds, **Oct. 21-22.** Contact Gregory Patcham, Michigan State University, Cooperative Extension Service, North Office Building, 1200 N. Telegraph, Pontiac, MI 48053, 313/858-0887.

Environmental Management Association National Educational Conferences and A/V Show, Breckenridge Hotel, St. Petersburg Beach, FL **Oct. 25-30.** Contact Harold C. Rowe, 1701 Drew Street, Clearwater, FL 33515, 813/446-1674.

Fundamentals of Ground-Water Quality Protection, Pittsburgh Marriott Inn (Greentree), Pittsburgh, PA, **Oct. 27-28.** Contact Richard M. Miller, American Ecology Services, Inc., 127 East 59th Street, New York, NY 10022, 212/3711620.

Coal Conference & Expo VI, Kentucky Fair and Exposition Center, Louisville, KY, **Oct. 27-29.** Contact Fred Hufnagel, P.O. Box 17413, Dulles International Airport, Washington, DC 20041, 703/471-5761.

Trees for Reclamation in the Eastern U.S., Lexington, KY, **Oct. 27-29.** Contact Don Eagleston, U.S. Forest Service, 204 Center St., Berea, KY 40403.

Wisconsin Golf & Turf Symposium, Pfister Hotel, Milwaukee, WI, **Oct. 29-30.** Contact Bob Welch, Milwaukee Sewerage Commission, 8500 South Fifth Ave., Oak Creek, WI 53154, 414/764-2300.

Atlantic Seedsmen's Associations' 27th Annual Convention, Mills House Hotel, Charleston, S.C., **Oct. 30.** Contact Margaret Herbst, Executive Secretary, 230 Park Ave., New York, NY 10017.

68th Annual Grounds Management Conference and Trade Show, Plaza Hilton Inn, Kansas City, MO, **Nov. 2-6.** Contact Allan Shulder, Executive Director, Professional Grounds Management Society, 7 Church Lane, Pikesville, MD 21208, 301/653-2742.

Design/Build Symposium, Hyatt Regency Hotel, Atlanta, GA, **Nov. 4-7.** Contact Associated Landscape Contractors of America, 1750 Old Meadow Road, McLean, VA 22102, 703/821-8611.

Tidewater Virginia Professional Horticultural Conference and Trade Show, Ramada Inn, Virginia Beach, VA, **Nov. 5-6.** Contact Roger R. Huff, City Arborist, Municipal Center, Virginia Beach, VA 23456, 804/427-4461.

Wisconsin Park and Recreation Associations' 15th Annual Conference, Playboy Resort, Lake Geneva, WI, **Nov. 5-6.** Contact Jack Schumann, Racine Park & Recreation Dept., 800 Center Street, Room 127, Racine, WI 53403, 414/636-9131.

Washington State Weed Association annual meeting, Convention Center,

Continues on page 74

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Yakima, WA, **Nov. 5-7.** Contact Alan R. Hattrup, Publicity Chairman, WSWA.

Southern Turfgrass Conference, Birmingham Hyatt House, Birmingham, AL, **Nov. 9-12.** Contact Dr. Euel Coats, Executive Secretary, Southern Turfgrass Association, Drawer CP, Mississippi State, MS 39762, 601/325-3138.

National Institute on Park and Grounds Management 10th Educational Conference, Sheraton Twin Towers, Orlando, FL, **Nov. 9-13.** Contact National Institute, Box 1936, Appleton, WI 54913, 414/733-2301.

Intensive Course on Herbicide Action, Purdue University, West Lafayette, IN, **Nov. 10-21.** Contact Continuing Education Business Office, Room 110, Stewart Center, Purdue University, West Lafayette, IN 47907.

National Lawn Care Business Conference, Sheraton Twin Towers Hotel, Orlando, FL, **Nov. 11-12.** Contact Lawn Care Conference, Box 1936, Appleton, WI 54913, 414/733-2301.

14th Annual Clemson Turfgrass Conference, Clemson University, Clemson, SC, **Nov. 11-12.** Contact Dr. Landon C. Miller, Dept. of Horticulture, Clemson University, Clemson, SC 29631, 803/656-3403.

New York State Turfgrass Association Annual Conference & Trade Show, Gennessee Plaza Holiday Inn and Rochester War Memorial, Rochester, NY, **Nov. 11-13.** Contact Ann Reilly, Executive Secretary, New York State Turfgrass Association, 210 Cartwright Blvd., Massapequa Park, NY 11762, 516/541-9034.

Professional Lawn Care Association of America First Annual Convention, Commonwealth Convention Center Exhibit Hall, Louisville, KY, **Nov. 12-14.** Contact Glenn Bostrom, Executive Director, PLCAA, Suite 1717, 435 N. Michigan Ave., Chicago, IL 60611, 312/644-0828.

NGF National Golf Course Operations Workshop, Dunes Hotel, Las Vegas, NV, **Nov. 16-19.** Contact NGF, 200 Castlewood Drive, North Palm Beach, FL 33408.

Georgia GCSA 11th Annual Turfgrass Short Course, Center for Continued Education, University of Georgia, Athens, GA, **Nov. 17-18.** Contact George Kozelnicky, Executive Secretary, Georgia GCSA, Dept. of Plant Pathology & Plant Genetics, University of Georgia, Athens, GA 30602, 404/542-2571.

80th Annual ASLA Meeting, Denver Fairmont Hotel, Denver, CO, **Nov. 22-25.** Contact Robert L. Woerner, ASLA President, 1900 M Street, N.W., Suite 750, Washington, DC 20036, 202/466-7730.

Sixth Annual Professional Landscape Management School, Evansville, IN, **Nov. 24-25.** Contact Allen Boger, Extension Agent, Horticulture, Room 202, City-County Building, Evansville, IN 47708, 812/426-5287.

New Jersey Turfgrass Expo '80, Hyatt House, Cherry Hill, NJ, **Nov. 24-28.** Contact Dr. Henry W. Indyk, General Chairman, Cook College, Rutgers University, Box 231, Soil & Crops Dept., New Brunswick, NJ 08903, 201/932-9453.

Maintenance Symposium for ALCA, Washington Plaza Hotel, Seattle, WA, **Dec. 1-3.** Contact Associated Landscape Contractors of America, 1750 Old Meadow Road, McLean, VA 22102, 703/821-8611.

Texas Turfgrass Conference, Rudder Conference Center, Texas A&M University, College Station, TX, **Dec. 1-3.** Contact Richard L. Duble, Soil & Crop Sciences Dept., Texas A&M University, College Station, TX 77843, 713/845-4826.

TREE TRUCKS AND CHIPPERS

(28) 1968-72 GMC 5500 series with crew cabs and dump chip boxes. Running condition but all need repairs. **$1200 to $2200.**

(2) 1973 GMC 6500 Dumps w/reach all hyd crane. V/85 sp. **$4500 each.**

(2) 1973 Ford F750 V/85 sp. w/reach all hyd crane. **$4500 each.**

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(6) 4-5yd Ford Chevrolet Dumps V/8's etc. **$2000 to $7000**

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1-5 cases: _____ @ $139.50/case $ _____
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TOUCHDOWN
Kentucky bluegrass

PLANT VARIETY PROTECTION CERTIFICATE No. 7400066

POA ANNUA... FINALLY MEETS ITS MASTER

. . . University of Illinois at Urbana-Champaign

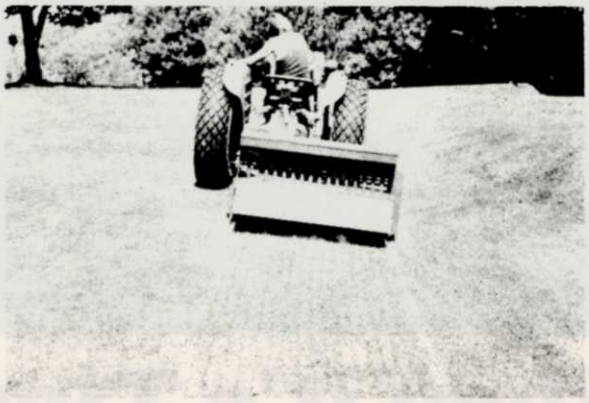
Dr. A. J. Turgeon and co-workers J. E. Haley and J. R. Street conducted intensive Kentucky bluegrass cultivar management studies.

Twenty-one cultivars were planted in September 74. Varying management regimes were imposed to measure their competitiveness against the infestation of Poa annua.

They concluded: *"The most impressive differences among cultivars were observed under close mowing (0.75") and high fertilization (8 lb./N per 1000 sq. ft.). Several of the cultivars were virtually overrun by Annual bluegrass while others remained nearly weed free. Those cultivars which are apparently best adapted to this cultural intensity include A34, Brunswick and Touchdown".*

Touchdown fights Poa annua two ways: First — its superior disease resistance means it won't thin out from Crown rot (Leaf spot) Leaf rust, Stripe smut or today's Fusarium so Poa can't get a foothold . . . and secondly it's so aggressive and dense in growth habit it just keeps on fighting Poa.

Touchdown is ideal for overseeding . . . it germinates fast and quickly develops a healthy, mature turf.



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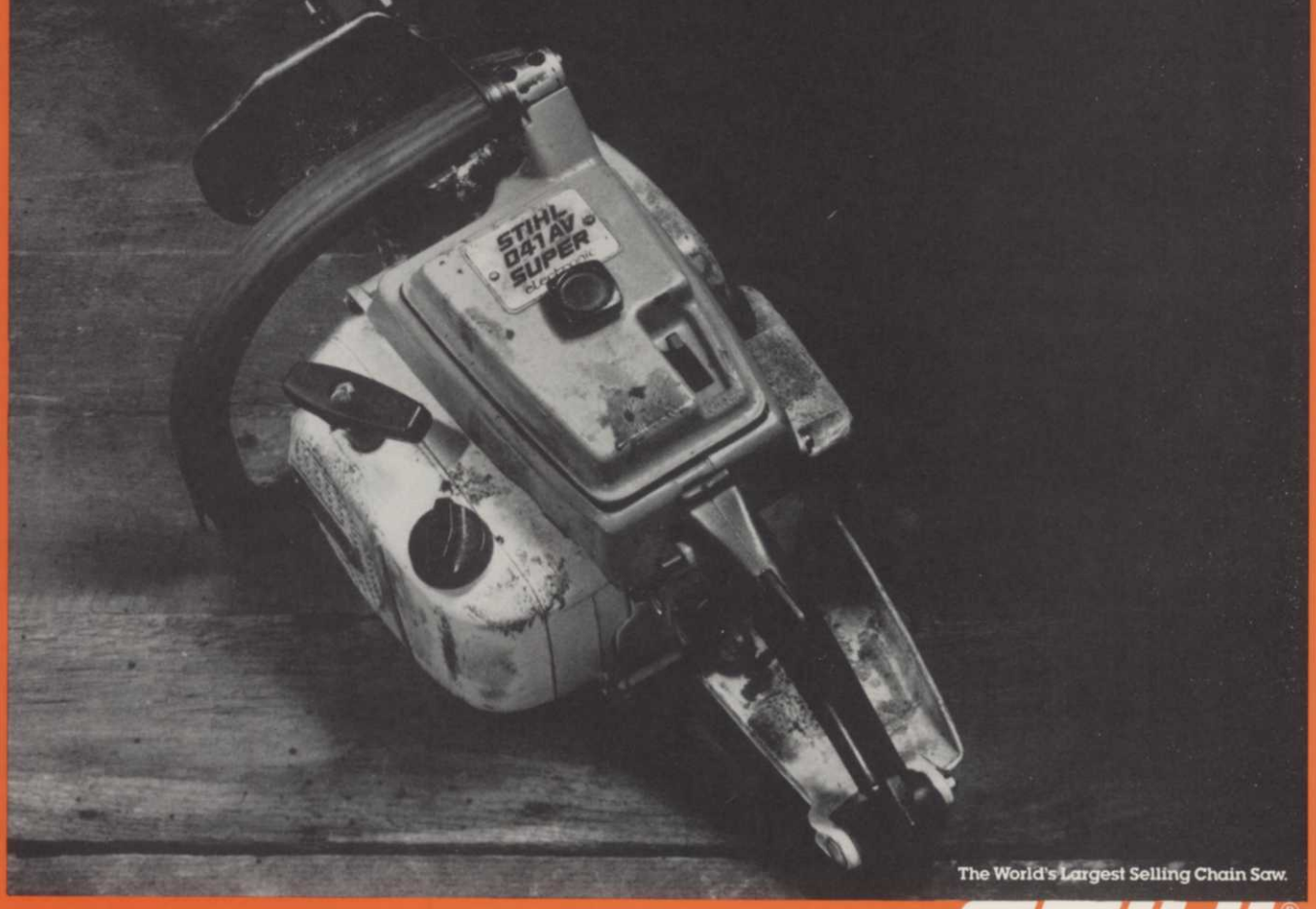

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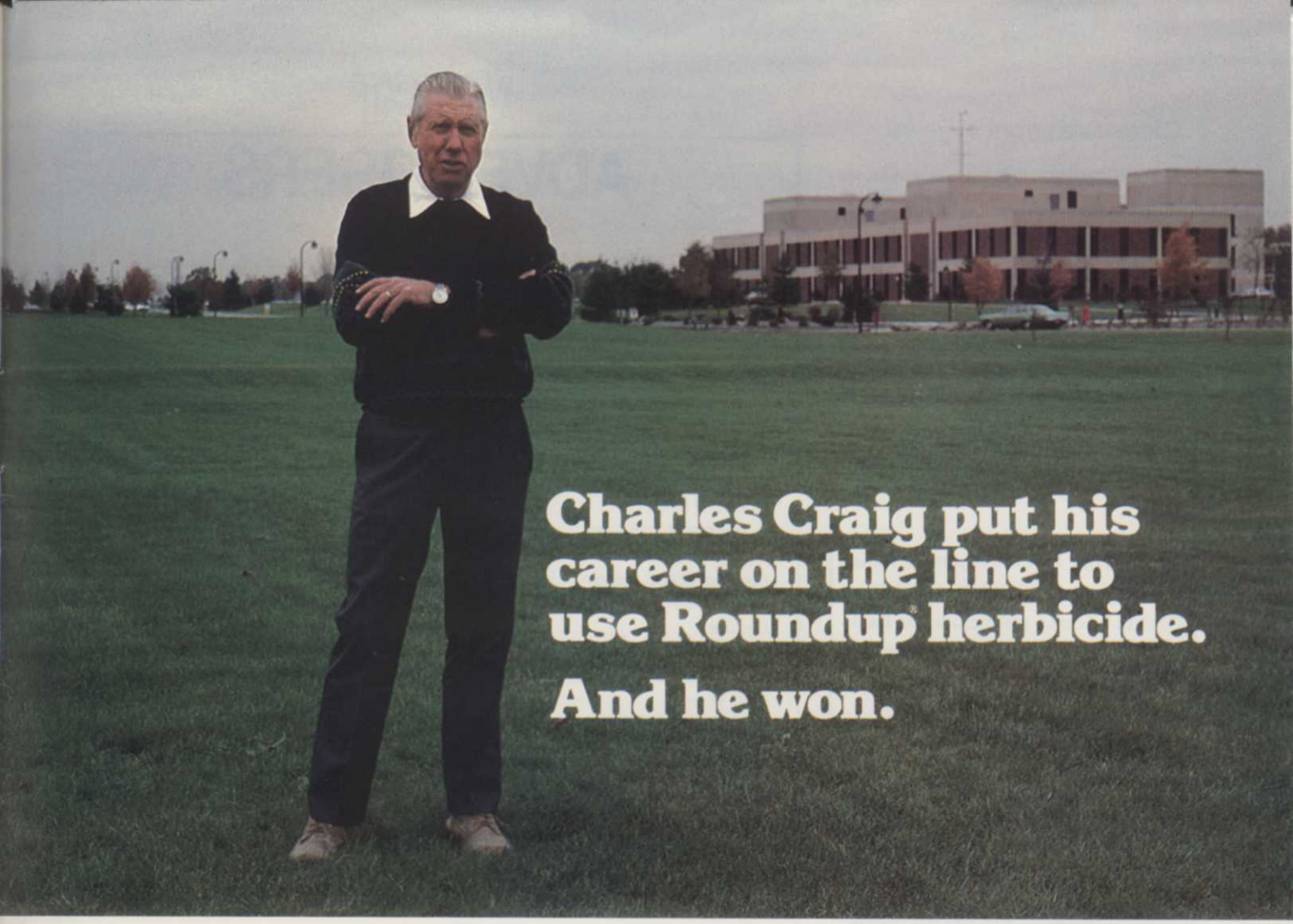

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